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Beliefs, Spontaneous (naive) explanation of accidents, risk perception, perception of preventive actions and safety behavior among health care workers in Nigerian hospitals

Nwadiogo Arinze

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THÈSE

Pour obtenir le grade de

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Spécialité : PSYCHOLOGIE DU TRAVAIL ET ERGONOMIE

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Présentée par

Nwadiogo ARINZE

Thèse dirigée par Pr. **Dongo Rémi KOUABENAN**, Pr. UNI.

Université Grenoble Alpes

Préparée au sein du Laboratoire interuniversitaire de Psychologie/Personnalité, Cognition, Changement social (LIP/PC2S) dans l'École Doctorale Sciences de l'homme, du Politique et du Territoire (SHPT)

Croyances, explication naive (spontanée) des accidents, perception du risque, perception des actions préventives et comportement en matière de sécurité des travailleurs de secteur d'hospitalier au Nigéria.

Beliefs, Spontaneous (naive) explanation of accidents, risk perception, perception of preventive actions and safety behaviour among health care workers in Nigerian hospitals

Thèse soutenue publiquement le **20 July 2022**,
devant le jury composé de :

Mme Céline Baeyens

Pr de psychologie clinique, Université Grenoble Alpes, Présidente

M. Dongo Rémi Kouabenan

Pr de psychologie du travail et des organisations, Université Grenoble Alpes, Directeur de thèse

M. Robert Ngueutsa

MCF de psychologie du travail et des organisations, Université Bourgogne Franche-Comté, Examineur

Mme Christine Roland-Lévy

Pr de psychologie sociale, Université de Reims Champagne-Ardenne, Rapporteur

M. Philippe Sarnin

Pr de psychologie du travail et des organisations, Université Lumière Lyon 2, Rapporteur

DEDICATION

To my loving husband and children, thank you for your love, patience, support and prayers.

To my elder sister Somto Nnadum, thank you for taking care of my children all these years. To my parents, I am ever grateful for your continued support. I am thankful for all your prayers and encouragement.

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ABSTRACT

This thesis aims to examine the relationship between beliefs (fatalistic, control and normative), naive explanation of accident, perception of risk, perception of preventive actions and protective behaviour. It consists of two studies. The first study aims to identify the causes of accidents in Nigerian hospitals, the perceived risks, the various forms of beliefs that exist among healthcare workers towards hospital risks and accidents, the perception of preventive actions and the protective behaviour of health workers in the workplace. This study was carried out through semi-structured interviews with 45 health workers belonging to three categories, namely doctors (professionals and generalists), scientists/laboratory technicians and nurses (professionals and midwives). It appears that health care workers are faced with risks and causes of accidents that result from individual actions and external elements. In addition, fatalistic beliefs and control beliefs emerge as the types of beliefs most identified as being involved in hospital work safety in Nigeria. The second study was conducted among 611 healthcare workers using a self-reported questionnaire, to test the link between beliefs (fatalistic, control and normative), causal explanations of accident, perception of risk, perception of preventive actions and safety behaviour. Our results show that fatalistic beliefs are linked to dangerous behaviours and to a low perceived effectiveness of preventive actions in the workplace. Additionally, healthcare workers with high perceived behavioural control tend to overestimate the severity and controllability of hospital risk and perceive high effectiveness of preventive actions. Furthermore, normative beliefs are associated with high perceived likelihood and severity of hospital risk and high perceived efficacy of preventive actions. Moreover, perceiving the effectiveness of preventive actions encourages the adoption of safety behaviours. Furthermore, workers who explain accidents by external factors perceive

preventive actions as ineffective. It has also been observed that the overestimation of the perceived seriousness of hospital risks leads healthcare workers to adopt safe behaviours. Interaction analysis shows that the positive relationship between internal causal explanations and perceived effectiveness of preventive actions is stronger in younger healthcare workers. Finally, the results show that the effect of control beliefs on safety behaviour is mediated by internal causal explanation of accident. In general, the results of this thesis are mainly in line with past studies in this field and contributes some enhancement to the theoretical considerations. The practical implications and targeted recommendations of this thesis indicates that several intervention strategies can improve the safety and well-being of healthcare workers in Nigerian hospitals. Among which are programs that targets reducing or changing healthcare workers fatalistic beliefs to improve workers recognition of personal contributions to accident occurrence and safety.

RÉSUMÉ

Cette thèse vise à examiner la relation entre les croyances (fatalistes, de contrôle et normatives), l'explication naïve de l'accident, la perception du risque, la perception des actions préventives et le comportement de protection. La présente thèse se compose de deux études. La première étude vise à identifier les causes des accidents dans les hôpitaux nigériens, les risques perçus, les diverses formes de croyances qui existent parmi les membres du personnel hospitalier à l'égard des risques et des accidents hospitaliers, la perception des actions préventives et le comportement de protection des membres du personnel hospitalier sur leur lieu de travail. Cette étude a été réalisée par le biais d'entrevues semi-directives avec 45 membres du personnel hospitalier appartenant à trois catégories, à savoir les médecins (professionnels et généralistes), les scientifiques/techniciens de laboratoire et les infirmières (professionnelles et sage-femmes). Il ressort que les membres du personnel hospitalier sont confrontés à des risques et causes d'accidents qui résultent d'actions individuelles et d'éléments extérieurs. De plus, les croyances fatalistes et les croyances de contrôle apparaissent comme les types de croyances les plus identifiées comme étant impliquées dans la sécurité du travail en milieu hospitalier au Nigeria. La deuxième étude a été menée auprès de 611 membres du personnel hospitalier à l'aide d'un questionnaire auto-rapporté, pour tester le lien entre les croyances (fatalistes, de contrôle et normatives), les explications causales de l'accident, la perception du risque, la perception des actions préventives et le comportement de sécurité. Nos résultats montrent que les croyances fatalistes sont liées à des comportements dangereux et à une faible efficacité perçue des actions préventives en milieu hospitalier. De plus, le personnel hospitalier ayant un contrôle comportemental perçu élevé tend à surestimer la gravité et la contrôlabilité du risque hospitalier et perçoit

une efficacité élevée des actions préventives. En outre, les croyances normatives sont associées à une probabilité et à une gravité perçues élevées du risque hospitalier et à une efficacité perçue élevée des actions préventives. De plus, percevoir l'efficacité des actions de prévention incite à adopter des comportements de sécurité. Par ailleurs, personnel hospitalier qui explique les accidents par des facteurs externes perçoit les actions de prévention comme étant inefficaces. On observe également que la surestimation de la gravité perçue des risques hospitaliers conduit le personnel hospitalier à adopter des comportements sécuritaires. Les analyses d'interaction montrent que la relation positive entre les explications causales internes et l'efficacité perçue des actions de prévention est plus forte chez les jeunes travailleurs hospitaliers. Enfin, les résultats montrent que l'effet des croyances de contrôle sur le comportement de sécurité est médiatisé par l'explication causale interne de l'accident. En général, les résultats de cette thèse s'inscrivent en accord avec les études antérieures dans ce domaine et contribuent à améliorer les considérations théoriques. Les implications pratiques et les recommandations ciblées de cette thèse indiquent que plusieurs stratégies d'intervention peuvent améliorer la sécurité et le bien-être des travailleurs hospitaliers dans les hôpitaux nigériens. Parmi celles-ci, les programmes qui visent à réduire ou à modifier les croyances fatalistes membres du personnel hospitalier afin d'améliorer la reconnaissance par les travailleurs de leurs contributions personnelles aux accidents et à la sécurité.

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General Introduction

Risks and accidents among Nigerian healthcare workers pose a threat to their health and safety which necessitates greater attention towards prevention and management. On the 20th of July 2014, Nigeria was exposed to Ebola disease by a traveler from Liberia and between the months of July 2014 to September 2014, a total of 894 cases were recorded. During this breakout eight people lost their lives of which four out of these deaths were healthcare personnel. In 2018, there was an outbreak of Lassa fever in Nigeria with most cases in 3 states (Edo, Ondo, Ebonyi). The 2018 Lassa fever outbreak was a major one among others because of its high morbidity and mortality rate among healthcare workers in tertiary health facilities. The epidemiological report by the World Health Organization (WHO, 2018) has it that between the months of January and March 2018, a total of 1121 suspected cases of Lassa fever were recorded from 18 states and by May 2018 the cases rose to a total of 1,893. In these Lassa fever cases, 423 were laboratory-confirmed cases and 37 of the confirmed cases involved healthcare workers among whom eight deaths occurred in a total of 106 deaths that were recorded.

Moreover, on the 8th of April 2020 Nigeria lost a medical doctor from Daura in Katsina state in the northern part of Nigeria, who was the first doctor to die from Coronavirus infection. Also, on the 15th of April 2020 another doctor who was being described as an intelligent Nigerian doctor died of Covid-19 infection. More so, from the month of April to September 2020, about 284 HCWs in Kaduna state alone were infected with Coronavirus. Subsequently, the situation updates on COVID-19 as of May 27th, 2020, by the WHO African region showed that about 606 Nigerian health workers were infected with COVID-19 (WHO, 2020). In addition, the report on the number of confirmed cases of COVID-19 in the report of the WHO African Region from 25

February – 22 September 2020 showed that 2175 Nigerian healthcare workers have been infected with the virus. Many more HCWs were infected daily and some of the health workers lost their lives, but we do not know the actual number of the health personnel affected by the pandemic in Nigeria as the figure changes daily. Moreover, many cases of other forms of injury have been recorded among Nigerian healthcare workers. The mostly experienced of these is needle stick injury, blood splash, molestation by patients and relatives etc. A study with Nigerian healthcare sample showed that more than 50 percent of the respondents have experienced needle stick injury. Some other research with Nigerian HCWs has shown that they fall victim of contracting infections such as tuberculosis, HIV, hepatitis, Lassa fever among many others.

Over the years, at normal working conditions and at every incidence of pandemic or outbreak of endemic infections, Nigerian government is charged with the responsibility of securing the lives and safety of its HCWs. They brace-up on sensitization of HCWs on safety protocols and provision of required personal protective equipment (PPE). In some cases, training is being organized to acquaint the HCWs with the necessary knowledge and guide on how best to protect themselves from health risks. Like in the case of Ebola, special medical teams were trained on the nitty-gritties to handle Ebola cases to limit the rate of transmission to HCWs. Isolation centers were created to curb the rate of transmission of these infectious diseases. In 2020, about 10,000 healthcare workers under the support of the World Health Organization (WHO) in Nigeria, received training on ‘infection prevention and control measures’ to combat the level of COVID 19 transmission to HCWs. The trained HCWs were trained to train thousands of other HCWs in Nigeria. In addition, there was massive publicity and sensitization on COVID 19 infection and safety measures on how to combat the pandemic.

Indeed, through media publicity and official websites, certain activities of the Nigerian government and health management to salvage health crises among healthcare workers during normal working conditions and during pandemics and outbreaks of infections are known. There is always emphasis on the need to sensitize, train, retrain and remind HCWs about protocols as cases of HCW accidents and infections are reoccurring. These actions have not justified a significant decrease in the exposure of HCWs to risks of diseases and accidents at the workplace. We may be left with the thought that the systematic actions of hospital management on HCW safety may not be sufficient in maintaining an effective preventive approach. Hence the need for further analysis of the likely factors among HCWs that jeopardizes the effectiveness of hospital accident preventive measures.

Presently, we cannot decipher HCWs contribution to these hospital incidences. We will first mention that there is paucity of information or records on how the actions of the government and management are being evaluated by HCWs themselves. We do not know how HCWs perceive their vulnerability to these hospital hazards and how their interpretation of the situation influences their behavior at work. We think that exploring these facts with HCWs and the accidents they face at the workplace can shed light on HCWs accidents and the prevention of such accidents. In this regard, the model of naive causal explanation of accidents initiated by Kouabenan (1999) would be an important concept for understanding the behaviour of healthcare workers when they are faced with risks. This places relevance on unravelling the causes of accidents for effective analysis and prevention geared towards modification of workers behaviour. Kouabenan (2009) demonstrated the effectiveness of accident prevention by recognizing individual representations about the risk they face and their personal characteristics as factors that

can influence peoples' behaviour. Presumably, many factors are likely to explain the behavior of HCWs in Nigerian hospitals. In essence, we can understand the behaviour of HCWs based on their psychological processes and explanatory factors of the attitudes of health workers who face risk situations. Therefore, we are set to examine workers' beliefs, their risk perception, their naive or spontaneous causal explanation of accidents, their perception of prevention actions and the effect of these psychological processes on their behaviors of security. This enquiry will be developed in two parts of five chapters each.

The first part (chapter 1 to 5) will cover a theoretical review of the study. In chapter one, we propose to explain in detail the prevalence of hospital accidents, the various strategies met to salvage the health safety problem of HCWs in Nigeria and the issues challenging the effective implementation of these preventive initiatives. The second chapter will portray an in-depth review on naive explanations of accidents as a psychological construct that can be integrated in the study of behaviour when faced with risk. Thirdly, we would review the role of risk perception on behaviour with focus on perceived risk severity, risk probability and risk controllability. We also seek to examine the variations on perceived risk according to risk characteristics and the psychosocial characteristics of the perceiver. In the fourth chapter, we want to know how beliefs can affect the perception of risk, the explanation of accidents as well as the behavior of safety. Certainly, perception of risks and the naive explanation of accidents are two socio-cognitive functions that makes it possible to understand individuals' attitudes on prevention dependent on their beliefs (Kouabenan, 2006). In the last chapter of the first part, we will state the general problem and the general hypothesis of the study. In this part, we will examine the relationship between beliefs, causal explanation and risk perception to determine HCWs behaviour in Nigerian hospitals.

The second part of the thesis (chapters 6 to 10) for the empirical analyses will apply the knowledge explored in the previous chapters. First, we aim to investigate health workers perceptions about risks in the hospital, their patterns of causal explanations of accidents, their beliefs, and safety behaviors meted to manage risks using interviews as a tool of inquiry. Secondly, we would analyze the role of beliefs on perceived effectiveness of preventive actions and safety behaviour of health workers in the hospital. Thirdly, we also propose to see how naive causal explanations affect perceived effectiveness of preventive actions and safety behaviour of health workers. Following the same procedure, in the fourth analysis, we wish to determine how risk perception affects healthcare workers perceived effectiveness of preventive actions and their safety behaviour. The fifth analysis will focus on the link between beliefs, naive explanation of accidents, risk perception, and safety behaviors. We will end with a general discussion and conclusion. In the general discussion, we will put together all the results of the various studies and discuss their relevance based on our problematic theories. Additionally, in the general conclusion, the added relevance of the studies to the knowledge of safety and prevention strategies in the health sector and the limitations of the studies will be discussed.

**FIRST PART: BELIEFS, NAIVE CAUSAL
EXPLANATION OF ACCIDENTS AND
RISK PERCEPTION: MODELS FOR
INSIGHT INTO BEHAVIOR OF
HEALTHCARE WORKERS IN NIGERIAN
HOSPITALS**

Chapter 1: Occupational accidents and diseases in the health sector: The case of Nigeria

Introduction

Healthcare workers are at the frontline of patient care in an environment that is regarded as one of the most hazardous workplaces (Crutcher et al., 1991; Pruss, Giroult, & Rushbook, 1999). To explain the phenomenon of accidents, the nature of the definitions can depend on the context and the purpose, such as accident prevention, workers compensation and statistics (OSHWiki, 2021). Accident definition from the context of prevention focuses on occurrence for accident investigation and analysis, with the primary aim for an in-depth understanding of the underlying causes to prevent related future occurrences and to improve the safety of the populations at risk (OSHWiki, 2021). According to Bird and Germain (1966 in OSHWiki, 2016) an accident is an “unintended or unplanned happening that may or may not result in property damage, personal injury, work process stoppage or interference, or any combination of these conditions under such circumstances that personal injury might have resulted”. For the International labor organization (ILO, 2015), organizational accidents are work incidences that emanates in the course of duty, resulting in adverse or non-adverse effects. In health organizations, the vulnerable population to health hazards and diseases are mostly the healthcare workers (HCWs). Healthcare workers are group of individuals who render various forms of healthcare services with the primary goal of protecting and improving the health of the members of their societies (World Health Organization, 2006).

Healthcare workers exposure to different forms of occupational risks including illnesses and diseases possess threat to their lives, security, well-being and safety, as these

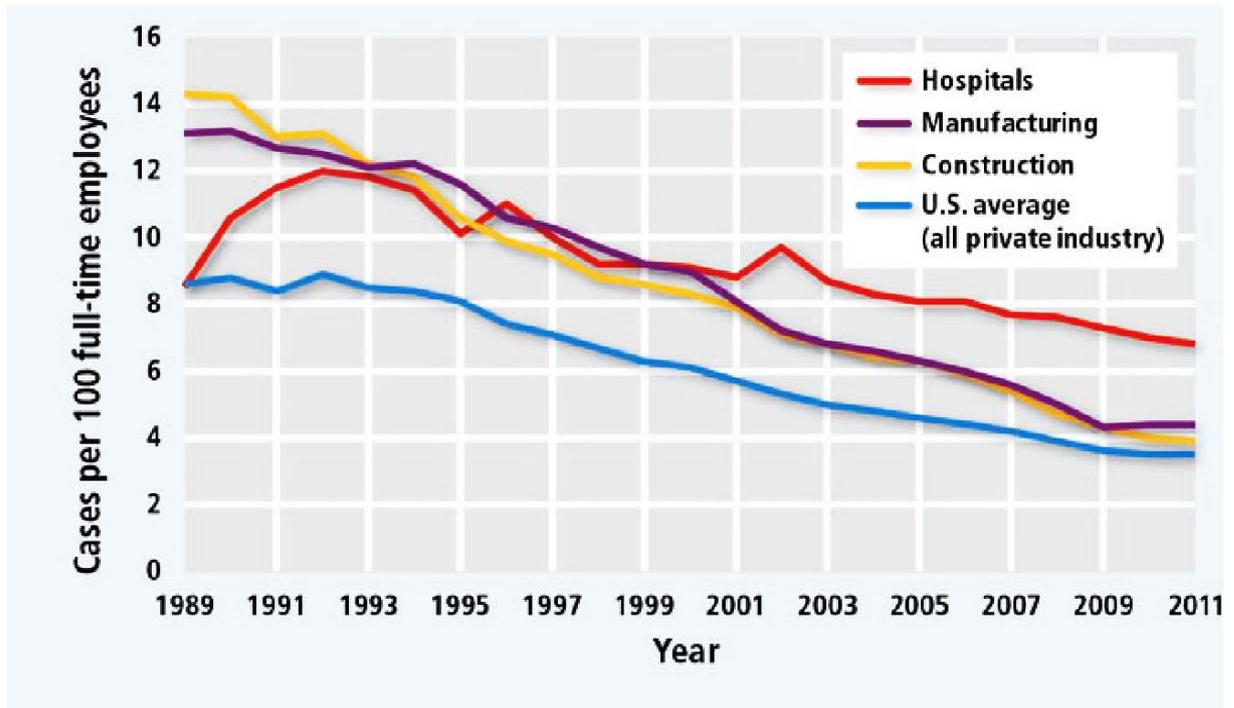
incidents remain the source of morbidity and mortality in the health industry. Indeed, the effect of these occupational accidents on workers can be devastating and can equally extend to their dependents which cut across physical, financial and psychological damages (Gestal, 1987). A report of the World Health Organization by Peden et al. (2004 cited by Ngueutsa, 2012) stated that “*for every person killed, injured or disabled by a traffic accident, a whole group of other people, including the family and the entourage of the person concerned, are deeply affected*”(p. 19). This could also apply to every other work accident situation. For instance, a healthcare worker who dies from an occupational accident, injured or infected with an infectious disease, affects the family members and other people related to the victim because emotionally and financially, they are greatly involved. In some cases, HCWs who get infected at work may end up infecting their family members.

It is estimated that HCWs constitute about 12% of the working class across the world (Goniewicz et al., 2012). Indeed, they are vulnerable to hospital hazards and diseases and the rate of their exposure to these work incidences will be discussed in the following paragraph.

1. Prevalence of organizational accident

In some professions, like health, mining, building and construction, etc., the prevalence of risk and accident instills worry and so much concern as their severity can be quite overwhelming. Going by statistics, a greater number of the 2.9 billion workers all over the world are vulnerable to occupational risks (Concha-Barrientos et al., 2005). Takala (1998) noted that an annual estimation of more than 300,000 workers across the globe, die from occupational injuries, with an increased number of disabilities which has

become a public health issue. He further noted that the rate of death caused by these injuries is higher in developing countries because workers are exposed to a wide range of hazards that are detrimental to their life in addition to the limited existence of facilities for injury prevention, treatment, and rehabilitation. Moreover, statistics have shown that an estimate of 100,000 people loses their lives from work illnesses, with about an annual diagnosis of 400,000 new cases (Ajayi et al., 2006; Bell et al., 2013). A recent global record on work fatalities by the International Labor Organization (ILO, 2022) estimated that about 2.78 million deaths occur annually and 2.4 million of these deaths are linked to work-related diseases. In addition, the International Labor Organization (2015) stated that over 313 million workers are involved in non-fatal occupational accidents causing serious injuries and absences from work. According to the ILO (2015) it is estimated that 160 million cases of non-fatal work-related diseases occur annually. Following a 20-year record on work illness and injuries, the Organizational Safety and Health Administration (OSHA, 2013) mentioned that despite the decrease in the rate of injuries and illnesses in industries in the United States, which includes hospitals, injury and illness rate in hospitals remains almost double the rate in private industries including construction and manufacturing industries which are perceived to be relatively risky. The details of the distribution are shown in figure 1 below.

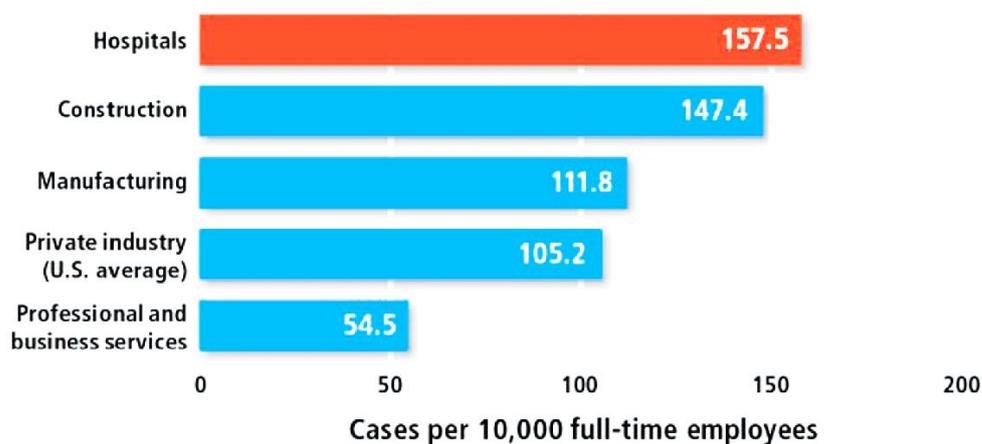


Source: Organizational Safety about Hospital Worker Safety (OSHA, 2013), facts about Hospital worker safety.

Figure 1: Injury and Illness rates by industry, 1989-2011

In figure 1 above¹, we see that hospital has the highest incidence rate of illnesses and injuries. Furthermore, from the facts about hospital worker safety, OSHA (2013) stated that hospitals generally have a higher rate of “days away” incidences than construction, manufacturing, or private industry. This could be seen in figure 2 below.

¹ Figure 1 shows incidence rates of injury and illness per 100 full-time equivalent employees (FTEs) in hospitals and selected other industries between the years 1989 to 2011. The data in the figure includes all OSHA-recordable injuries and illnesses resulting in days away from work or modified work duties.



Source: Organizational Safety and Health Administration (OSHA, 2013), Facts about Hospital Worker Safety

Figure 2: Incidence rates of Injuries and Illnesses in Days Away from work, 2011²

Moreover, hospital accident records of World Health Organization (WHO, 2002) showed that incidences of HCWs exposure to blood borne infections and diseases were estimated to have a high prevalence in developing countries like sub-Saharan Africa, with about 90% of the annual recorded infections across the globe. These blood pathogens are mostly contracted through needle prick, cuts from sharp, splashes of blood and direct contact with blood infected body parts (Ogoina et al., 2014). Literally, hospital accidents and diseases among hospital workers, especially in developing countries, are causing an unstable workforce whereby some people abandon their work and relocate to other countries. A research report on the lack of health personnel in the sub-Saharan Africa is described as a humanitarian service crisis leading to high rate of relocation of health workers. This situation results from unfair working state, poor earnings, low motivation and an overwhelming burden of contagious diseases, particularly HIV/AIDS (WHO,

² Figure 2 compares injuries and illnesses resulting in days away from work rates in 2011 per 10,000 FTEs between hospitals with other selected industries.

2006; Dovlo & Martineau, 2004). Another report of the World Health Organization (2006) on working together for health has shown that the global shortfall of health workers has amounted to a crisis in about 57 countries including Nigeria. Apart from the variations in hospital accident rate in developing and developed nations, accidents also vary based on the nature of the hospital.

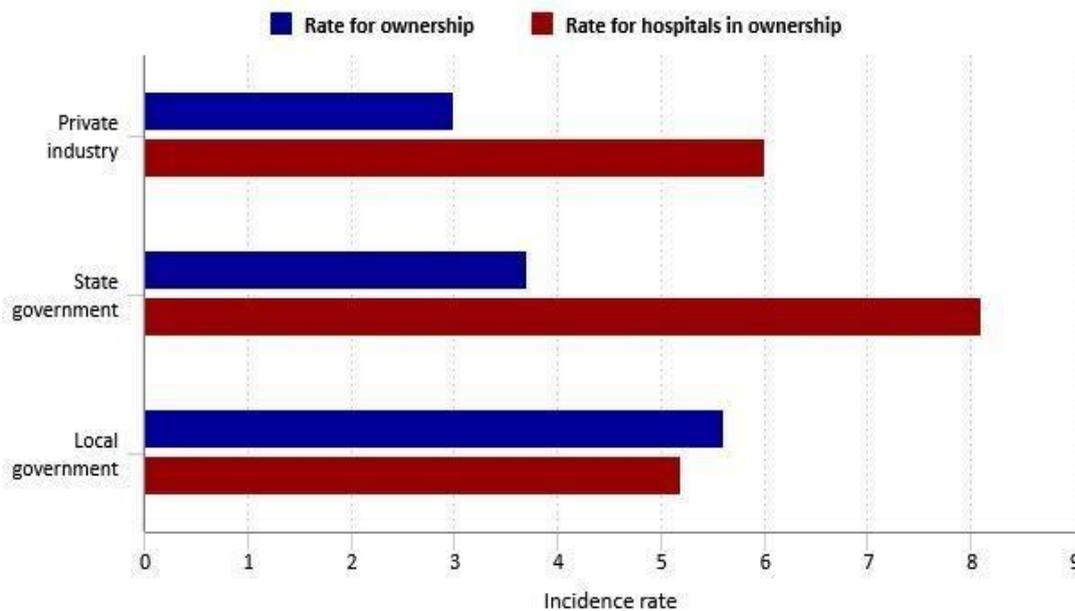
1.1. Accident situation based on hospital ownership type

Work accident situations according to hospital type, are explained with the available information in the statistical report on Hospital workers occupational injuries and illnesses, by the Bureau of Labor Statistics (BLS, 2017). The report of the Survey of Occupational Injuries and Illnesses (SOII)³ by BLS (2017) specified that evaluations of hospital based non-fatal injuries are according to the nature of the hospital. The Bureau of Labor Statistics (2017) hospitals in SOII are mostly classified according to “ownership” (private industry, state government, and local government). BLS (2017) also provided an analysis of the North American Industry Classification system (NAICS)⁴ for hospitals which was based on hospital services within each ownership category. These hospital groups in the 1.0 version, subsection 622 of the NAICS are the General medical and surgical hospitals (6221), the psychiatric and substance abuse hospitals (6222) and the specialty hospitals, exclusive of the psychiatric and substance abuse hospitals (6223). According to SOII by BLS (2017), hospitals in two of the three ownership categories

³ The Survey of Occupational Injuries and Illnesses (SOII) is a federal/state program that obtains statistics for the purpose of identifying problems relating to workplace safety which aids development of activities that improves work safety.

⁴ The North American Industry Classification System (NAICS) is the principle applied by Federal statistical agencies for categorizing business organizations which is aimed at collecting, analyzing, and publishing statistical data that concerns the U.S. business economy.

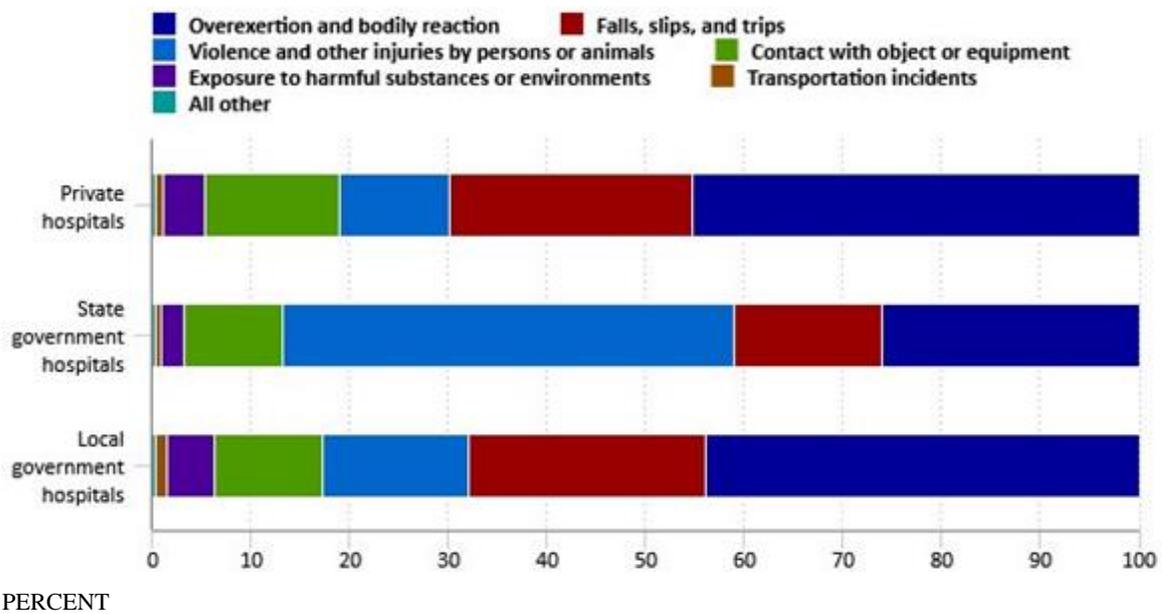
reported health worker injury and illness incidence rates that is above the total industry average for their respective ownerships which is shown in figure 3. The data provided in figure 3 indicates the incidence rate of nonfatal work injuries and illnesses among hospitals by ownership, 2015.



Source: Bureau of Labor Statistics (2017) Monthly Labor review.

Figure 3: Nonfatal work injuries and illnesses rates among hospitals, based on ownership 2015.

Additionally, the SOII data on the rate of some common cases of non-fatal occupational injuries for the hospitals based on type of incidence and ownership is shown in Figure 4. This gave an in-depth understanding on the rate and example of nonfatal injuries and illnesses Healthcare workers encounter at work.



Source: Bureau of Labor Statistics (2017) Monthly Labor review.

Figure 4: Distribution of non-fatal occupational diseases and injuries associated with days away from work among hospitals based on ownership 2015

The various reports on occupational and hospital incidence rate on illnesses and diseases have shown the prevalence of hospital occupational accidents and diseases across the world and in different continents. In the subsequent paragraph, we will discuss the state of hospital accidents and diseases among HCWs in Nigerian health sector.

1.2. Risk and accident situation in Nigerian hospitals

Nigeria as a developing country faces challenges of occupational risk in the health sector but the true situation of incidence rate among Nigerian healthcare workers is uncertain. It is difficult to obtain an official statistic that represents an accurate situation of work accidents among HCWs in the country. Firstly, in Nigerian health industry, not all hospital accidents are reported (Erhabor et al., 2007; Isara & Ofili, 2012). For example, Ibekwe et al. (2006) noted that work accidents among health-care workers in Africa is

mostly underreported and not well documented, with an example of a Nigerian study that discovered an up to 97% unreported exposures. Secondly, reports are mostly based on estimates which are not verifiable. Moreover, there is poor monitoring of accidents among HCWs (Pruss–Ustun et al., 2005). Therefore, it is difficult to ascertain the true prevalence of accidents in the Nigerian health sector. For these reasons, we will rely on a few reports of some authors and the information across the media to gain understanding into the situation of work accidents in Nigerian hospitals.

Basically, reports have shown that the rate of needle stick incidences is very high among Nigerian healthcare workers. Isara et al. (2015) reported 51% prevalence of needle stick injuries (NSIs) 12 months prior to their study. Their final report showed that Doctors (80%) had the highest cases of NSIs followed by Nurses (70%) with the paramedics being the least exposed. Also, Odeyemi et al. (2008) reported 72.9% prevalence of needle stick/sharps injuries among healthcare workers in a federal hospital in western Nigeria. This finding is relevant to the result of Mossburg et al. (2019) which shows 22 – 95% rate of NSIs among HCWs in Africa. Furthermore, Sofola et al. (2007) recorded 44.4% of HCWs exposure to blood-borne pathogens in Nigerian dental schools. In addition, Ogoina et al. (2014) stated that more than 70% of healthcare workers who participated in their study had experienced skin contact with the blood of patients. Notably, Odeyemi et al. (2008) established that these incidences commonly occur while administering an injection, during blood draw process, and when performing vein cannulation. Consequently, Sofola et al. (2007) found that 58.8% of their participants' have been exposed to blood borne pathogens. In the subsequent sub-topics, we will discuss further the categories of the different forms of accidents and diseases HCWs encounter at the workplace.

2. Categorization of accidents in the health sector and classification of healthcare workers

Occupational hazards in the health sector are enormous and services in the healthcare industry can be physically demanding. These hospital work risks can have a negative effect on the body of HCWs. Moreover, workers can sustain injury caused by a variety of people or things they encounter daily in their workplace. These hazards faced by healthcare workers are categorized based on the nature of risk. Table 1 presents the different categories of risk in the health industry and the examples of these hazards while table 2 shows the categorization of HCWs.

2.1. Understanding the categories of accidents in the health sector

Hospital risks are grouped into five main categories according to National Institute for Occupational Safety & Health (NIOSH)⁵ and they include 1) Physical hazards, 2) Chemical hazards, 3) Biological hazards, 4) Mechanical hazards and 5) Psychosocial stressors (Ergonomic factors). These forms of accidents encountered by HCWs as listed in the table below could result in fatal or non-fatal accidents or illness at the workplace. Collins English dictionary (2021) defines fatal accidents as accidents or illnesses that lead to someone's death. While nonfatal accidents are accidents or illnesses in which a victim survives but leads to one or more days of absence from work (EuroStat, 2018). The examples and outcome of these hospital risks are listed in table 1 below. In

⁵ NIOSH works towards generating new knowledge in occupational safety and health domain and to transfer that knowledge into practice for workers growth and wellbeing. NIOSH achieves this mission, by conducting scientific research, developing guidance and authoritative recommendations, circulates information, and acts on demands for workplace health hazard assessment. NIOSH acts in providing national and world leadership to prevent work-related illness, injury, disability, and death.

addition, an insight into the categories of the target sample of HCWs and their functions will be discussed in the next section.

Table 1 *Category of risks in the Health Care Sector (International Labor Organization, 2014)*

Risk Category	Examples	Health Consequences
Physical Agents or physical forms of energy	Radiation, lasers, noise, extreme temperatures, Electrical energy	Thermal or chemical burns, hearing loss, cancer, physical and psychological trauma
Chemical Chemical substances that are potentially toxic, including medications, solutions, and gases	Disinfectants, cleaning products and sterilant such as ethylene oxide, formaldehyde, and glutaraldehyde; drugs, waste anesthetic gases; hazardous anticancer drugs	Eye and skin irritation, asthma, allergy, dermatitis, other end-organ damage, cancer, spontaneous abortion and other reproductive effects
Biological Infectious agents, such as bacteria, viruses, fungi, or parasites, which may be transmitted by blood borne contacts, contaminated body secretions/fluids, needle-stick injuries, or via airborne spread	HIV, hepatitis B and C, influenza, VRE, MRSA; SARS, and MERS	HIV and AIDS, TB, hepatitis, liver cancer, and other diseases
Mechanical/Biomechanical Factors in the work environment that cause or lead to musculoskeletal injuries, strain, or discomfort. Awkward postures, lifting excessive weight, and other factors causing musculoskeletal strains	Lifting and moving patients, tripping/slipping and fall hazards	Musculoskeletal disorders, back and upper extremity injuries, repetitive strain injury
Psychosocial Stressors Stressful work climates, threats of physical violence, work organization, shift work	Unsafe staffing, workplace threats, bullying, physical violence, unsafe unit design	Physical injury, psychological stress

MERS, Middle Eastern respiratory syndrome; MRSA, methicillin-resistant Staphylococcus Aureus; SARS, severe acute respiratory syndrome; TB, tuberculosis; VRE, vancomycin-resistant Enterococcus. Table adapted from International Labor Organization (2014) NIOSH NORA Healthcare and Social Assistance “State of the Sector” 2009 and Health Wise⁶.

⁶ NORA stands for National Occupational Research Agenda is a research forum operating through National Institute for Occupational Safety & Health (NIOSH) for research on workplace injury.

2.2. The classification of the target sample of healthcare workers in Nigeria

Nigeria health workforce is one of the largest in Africa, but the need remains for an increased professional health personnel to meet the health needs of its over 173 million people. It is estimated that the ratio of Nigerian health workforce (nurses, midwives and doctors) is 20 HCWs for every 10,000 people which qualifies them as one of the countries with largest health workforce. This ratio is quite close to the minimum threshold of 22.8 per 10,000 people as recommended health service ratio by the World Health Organization (IntraHealth, 2016). Nevertheless, there is a broad imbalance in the distribution of health workers across the country as most health personnel prefer migrating to urban cities mostly Lagos state in the southern Nigeria, which causes inadequate availability of health workers in rural parts of the country (IntraHealth, 2016). This results in wide disparities in health status and access to care across the country. The healthcare personnel are classified according to the nature of the services they offer and their required academic qualifications. To easily understand this categorization, we can refer to table 2 below showing the 2008 revised International Standards Classification of Occupations (ISCO) as recorded in the Classification of health workforce statistics of the World Health Organization (2010). From among the categories of health professionals in the entire ISCO table, we extracted 4 categories of HCWs which are the target population for our studies.

Table 2 *Categories of the healthcare professionals (World Health Organization, 2010)*

Occupation category	ISCO code	Job description	Types of occupations classified here	Remarks
Generalist medical practitioners	2211	Generalist medical doctors (including family and primary care doctors) diagnose, treat and prevent illness, disease, injury, and other physical and mental impairments and maintain general health in humans through application of the principles and procedures of modern medicine. They plan, supervise and evaluate the implementation of care and treatment plans by other health care providers. They do not limit their practice to certain disease categories or methods of treatment and may assume responsibility for the provision of continuing and comprehensive medical care to individuals, families and communities.	Medical doctor (general), Medical officer (general), Physician (general), General practitioner, Family medical practitioner, Primary health care physician, District medical officer, Resident medical officer specializing in general practice.	Occupations included in this category require completion of a university-level degree in basic medical education plus postgraduate clinical training or equivalent. Medical interns who have completed their university education in basic medical education and are undertaking postgraduate clinical training are included here. Although in some countries 'general practice' and 'family medicine' may be considered as medical specializations, these occupations should always be classified here.
Specialist medical practitioners	2212	Specialist medical doctors diagnose, treat and prevent illness, disease, injury and other physical and mental impairments using specialized testing, diagnostic, medical, surgical,	Specialist physician (internal medicine), Surgeon, Anesthetist, Cardiologist, Emergency medicine specialist,	Occupations included in this category require completion of a university-level degree in basic medical education plus postgraduate clinical training in a

		<p>physical and psychiatric techniques, through application of the principles and procedures of modern medicine. They plan, supervise and evaluate the implementation of care and treatment plans by other health care providers. They specialize in certain disease categories, types of patients or methods of treatment, and may conduct medical education and research activities in their chosen areas of specialization.</p>	<p>Ophthalmologist, Gynecologist, Obstetrician, Pediatrician, Pathologist, Preventive medicine specialist, Psychiatrist, Radiologist, Resident medical officer in specialist training</p>	<p>medical specialization (except general practice) or equivalent. Resident medical officers training as specialist practitioners (except general practice) are included here. Although in some country, 'stomatology' may be considered as a medical specialization, stomatologists should be included under 'Dentists'-2261. Medical research professionals who participate in biomedical research using living organisms and do not undertake clinical practice should be excluded from here (classified under 'Life science professionals').</p>
Nursing professionals	2221	<p>Nursing professionals provide treatment, support and care services for people who need nursing care because of ageing, injury, illness or other physical or mental impairment, or potential risks to health, according to the practice and standards of modern nursing. They assume responsibility for the planning and</p>	<p>Professional nurse, Specialist nurse, Nurse practitioner, Clinical nurse, District nurse, Operating theatre nurse, public health nurse, Nurse anesthetist, Nurse educator</p>	<p>This category includes occupations for which competent performance usually requires formal training at a higher educational institution in nursing. The distinction between nursing and midwifery professionals and associate professionals should</p>

		management of the care of patients, including the supervision of other health care workers, working autonomously or in teams with medical doctors and others in the practical application of preventive and curative measures in clinical and community settings.		be made based on the nature of the work performed in relation to this definition. The qualifications held by individuals or that predominate in the country are not the main factor in making this distinction, as training arrangements for nurses and midwives vary widely between countries and have varied over time within countries.
Midwifery professionals	2222	Midwifery professionals plan, manage, provide and evaluate midwifery care services before, during and after pregnancy and childbirth. They provide delivery care for reducing health risks to women and newborn children according to the practice and standards of modern midwifery, working autonomously or in teams with other health care providers. They may conduct research on midwifery practices and procedures and implement midwifery education activities in clinical and community settings.	Professional midwife	This category includes occupations for which competent performance usually requires formal training at a higher educational institution in midwifery. The distinctions between nursing and midwifery professionals and associate professionals should be made based on the nature of the work performed in relation to this definition. The qualifications held by individuals or that predominate in the country are not the main factor in making this distinction, as

				training arrangements for nurses and midwives vary widely between countries and have varied over time within countries.
Medical and pathology laboratory technicians	3212	Medical and pathology laboratory technicians perform clinical tests on specimens of bodily fluids and tissues to get information about the health of a patient or cause of death. They test and operate equipment such as spectrophotometers, calorimeters and flame photometers for analysis of Biological material including blood, urine and spinal fluid.	Medical laboratory technician, medical laboratory assistant, Blood bank technician, Cytology technician, Pathology technician	This category includes occupations for which competent performance usually requires formal training in biomedical science, medical technology or a related field. Technicians who conduct laboratory tests on living organisms should be classified under 'Life science technicians'. Forensic science technicians, who perform clinical tests to aid in the Investigation of crimes should be classified under 'Physical and engineering science technicians'.

Source: Classification of health workforce statistics of the World Health Organization (WHO, 2010)

The groups of HCWs listed in table 2 are all perceived to be vulnerable to similar risk like blood-borne pathogens and other health hazards which constitute a problem to their health and safety in Nigerian health sector and the Nation as a whole. Owing to the level of hazards and exposures in healthcare sector, some actions have been put in place

to manage or prevent healthcare workers' accidents and diseases at the workplace and these will be reviewed next.

3. General machineries for Curtailing Occupational Accidents in the Health

Sector

The measures for preventing accidents in the health sector are classified into two groups according to the activities of the management on regulatory actions and roles of healthcare workers on prevention and management of hospital accidents and diseases.

3.1. General healthcare management regulatory actions

To ensure best practices among HCWs, work policies are created as a guide for workers to take actions towards accident prevention and management. An example is the policy for the prevention and management of needle stick injuries and blood borne virus exposures by the Newcastle upon Tyne Hospitals National Health Service (NHS, 2012). These policy version 7.1 Section 6 subsections 6.1 summarized the important principles of risk assessment and process of handling sharps: elimination, engineering controls (supply of safety materials), safe systems of work, use of appropriate personal protective equipment (PPE)⁷ and Vaccination. Concerning the ravaging pandemic of covid19, World Health Organization (WHO, 2020) published a manual titled coronavirus disease (covid-19) outbreak: rights, roles and responsibilities of health workers, including key considerations for occupational safety and health.

⁷ **PEP:** Post exposure prophylaxis is a short course of HIV medicines taken very soon after a possible exposure to HIV to prevent the virus from taking hold in your body (HIV.Gov, 29th January 2021).
PPE: Personal protective equipment is equipment worn to minimize exposure to hazards that cause serious workplace injuries and illnesses.

This manual contained the expected responsibilities of both employers and employees in handling pandemics like Coronavirus. The employers are charged with the responsibilities of maintaining HCWs in the health sector. Example is overall monitoring of workers compliance towards the use of personal protective equipment and to ensure that the equipment is well supplied. Apart from the functions of hospital management in accident prevention and management, health workers also have a role to play to maintain equilibrium on safety conditions at the workplace.

3.2. General healthcare workers responsibilities towards safety and prevention of hospital accidents and diseases

The primary responsibility of healthcare workers is to abide by work policies and procedures and to make sure they are trained on how to use all devices and use them safely to minimize the risk of injury to themselves, their patients, fellow workers, or members of the public (Newcastle upon Tyne Hospitals NHS Foundation Trust, 2012). Worker's responsibilities were also stated in the WHO (2020b) manual on Coronavirus Disease (Covid-19) Outbreak: Rights, Roles and Responsibilities of Health Workers (RRRHW), including important Considerations for Occupational Safety and Health. These among the vast policies and documentations on the responsibilities of healthcare workers at workplace.

3.3. Healthcare management regulatory actions in Nigeria

Oluwagbemi (2011) noted that in the past 30 years, Nigeria has improved in degree, refinement and diversity in establishing and maintaining best practices and machinery that are needed for carrying out high risk clinical procedures. In 2006 the

Nigerian Federal Ministry of Labour and Employment in partnership with the International Labour Organization (ILO) developed a baseline National Occupational Safety and Health Profile (NOSHP) to encourage effective management of safety and health at work in Nigeria. However, in the present, there is no national Occupational Safety and Health Board established in Nigeria (Nigeria Country Profile on Occupational Safety and Health, 2016). The duties of such a Board have been assumed by the Department of Occupational Safety and Health (OSH) of the Federal Ministry of Labour and Employment (FMLE). Their functions are listed in the section 5 subsections 5.1.1.3 of Nigeria Country Profile on Occupational Safety and Health (2016) which includes review of national policy and monitoring. Despite these policies and protocols in health services, health workers in Nigeria still record casualties at work. Therefore, we will take a moment to review the factors that could constitute challenges to the effectiveness of safety measures in the Nigerian health sector.

3.4. Challenges facing the implementation of safety standards in Nigerian hospitals

There are several factors that constitute challenges to safety and accident preventive actions in the Nigerian health sector. The susceptibility of healthcare workers to risks in the Nigerian hospitals is still a thing to be concerned with as more hospital base casualties are still being recorded. Moreover, studies that were carried out to evaluate the reports of accidents in the healthcare settings, displayed that the healthcare workers have a low conformity with the standard safety measures and a high tendency to avoid medical help after accidents (Saleh et al., 2020). Several other factors that are responsible for health occupational ailment and injuries according to Amosun et al. (2011) include

inadequate protection facilities and care, under staff, healthcare workers carelessness and negligence, poor knowledge of the operational skills of modern healthcare facilities. Also, Orji et al. (2002) noted that Nigerian health care workers are haphazardly prepared in dealing with occupational hazards, resulting in health damages such as illnesses and injuries while delivering their duties. According to Pruss-Ustun et al. (2005), there is a very low interest in control and supervision of health hazards and workers' vulnerability in low-income nations. In the study on the framework of occupational health and safety in Nigeria by Ngwama (2016), the problem of effective administration of work safety in Nigeria is because of: high level of selfishness and corruption, poor management of various sectors which leads to the worsening working and living conditions for millions of workers and their families. Ngwama (2016) also noted that government continuous leniency and passive attitude towards workers who do not recognize health and safety laws, even when their negligence leads to the death of a worker, is a major issue of concern. Furthermore, Ngwama (2016) stated that the Nigerian Ministry of Labour and Productivity that should function as a regulator has been crippled by inefficiency, inadequate facilities and untrained workforce as well as corruption which are tantamount with the Nigerian system are all challenges facing the productivity of work accident prevention in Nigeria.

Additionally, Sofola et al. (2007) found that accidents were poorly reported to authorities and there was no effective monitoring to ensure that workers report any exposure for proper action such as engaging in post exposure prophylaxis where necessary. Moreover, it has been noted that the OSH control in Nigeria is inefficient and inactive (Idubor & Osiamoje, 2013; Diugwu et al., 2012). Also, Okolie and Okoye (2012) believed the poor safety situation may be because OSH administration is not the primary

practice in Nigeria. This situation challenges the safety of Nigerian healthcare sector, and more studies are needed to analyze these conditions and how best to tackle it to improve workers safety conditions in Nigerian hospitals.

Conclusion

Hospital work accidents and diseases are proven to be a threat to the lives and safety of health workers. These health hazards can come as physical accidents or diseases which are also known as biological risks and are mostly communicable. Moreover, to have a true representation of accident statistics among HCWs in Nigeria has been limited by some factors such as underreporting and lack of accident monitoring. Notwithstanding, various research results on hospital hazards in Nigerian hospitals provides insights into the circumstances of these hospital accidents and diseases. The findings show that HCWs are daily exposed to different kinds of risks at the workplace which may result in fatal or non-fatal accidents. For instance, in the situation of COVID-19 the number of affected HCWs increases daily. Regardless of the actions that have been taken by the government and hospital management to limit accident situations among health workers, their significance is yet to be reported. Moreover, these actions are considered insufficient. Additionally, all the preventive actions and policies that have been emphasized upon for the prevention and management of risk and accident situations in the health sector did not consider individual representations and how they could influence accident situations. We do not know to what extent HCWs are concerned about the risks they face and how they perceive these risks. Answering these questions is very important in risk analysis and management.

According to Kouabenan (2006a & 2006b), it is important to consider individual perception about risks when assessing safety attitudes because defining work policies, their perceived effectiveness and motivations to comply depends on workers perception and acceptance. These perceptions are based on their Socio-cognitive characteristics. In essence, considering workers' perception about risks and accidents will improve employees' acceptance of the technical preventive measures designed by professionals on the account that they could recognize the link between what they perceive and the preventive measures. Also, a meta-analysis on risk perception and health behaviour by Brewer et al. (2007) showed that there is a link between risk perception and health behaviour. In addition, according to Kouabenan (1999), naive or spontaneous causal explanations of accidents given by individuals provide an understanding of accident situations and behaviour at work. Hence, risk perception and naive causal explanation of accident evident in individuals' beliefs, are important in understanding behaviour of workers at work. These socio-cognitive factors in risk analysis and prevention will be discussed in the following chapters starting with the naive causal explanation of accident.

Chapter 2: Naive causal explanation of hospital workplace accidents: mechanism for understanding healthcare workers behavior

Introduction

According to Lewis (1986) “any particular event that we might wish to explain stands at the end of a long and complicated causal history” (p.214). Supporting this assertion, Kelley (1973) note that causal attribution implies the propensity of people to explain incidents or behaviour by assessing the logical association between cause-and-effect variables. In the event to unravel these causal elements, causal explanations are given to best understand what initiates an incident and the behaviour associated with it. According to Pernanen (1993), people try to make sense of their environment and situations that give rise to actions by means of causal attribution. Therefore, causal attribution provides an insight into the cognitive and psychological mechanisms that influence individuals’ conduct. Moreover, in view of this, Kouabenan (2009) states that naive explanations of accidents, which are causal explanations given without recourse to any scientific method by experts or laypersons (employees), are crucial in understanding the composition of work accident, workers' inclination and their responses towards risks. Hofmann and Stetzer (1998) argued that peoples' explanations of accidents are embedded in the internal characteristics of the individuals, outside of the organizational factors which always manifest in a positive perception of internal communications regarding an accident. Therefore, to have an insight on how people make inferences to explain accident causes, the concept of causal attribution and its influence on behavior has been significantly identified as a useful model to accident analysis and prevention. This chapter will highlight the concept, theories and model of causal attribution, factors that can

influence causal explanations and the role of naive causal explanation of accident on safety behaviour.

1. Concept of causal attribution

Attribution theory has been an influential concept in psychology and in social sciences. In that, it has proved to be essential in providing answers to individual behavioral choices and the events that initiate the conduct. The concept was initially developed by Heider (1958) in the field of social psychology, which was later revised by several other authors markedly, Davis and Jones (1965); Kelley (1967) and Weiner (1979), resulting in several complementary, and at times extended, theories of attributions (Hewett et al., 2017). Irrespective of these evolutions, each of the theories still centers on how people make out causal inferences, their attributions and the consequences of these attributions on their behaviour.

1.1. Heider's (1958) notion on causal attribution

The notion of Heider (1958) on causal attribution lies on the assumption that people act as naive psychologists when trying to infer causal attributions to determine factors that are responsible for individuals' actions. According to Heider, these attributions are based on common sense for the purpose of understanding, predicting and regulating events. Generally, the theme of this concept is that people's perceived cause affects their behaviour. Heider (1958) noted that causal attributions can be made in various dimensions which include the dimension of locus of control that explains the internality (personal attributes) or externality (environmental attributes) of an attribution. Additionally, we will discuss Kelley (1967, 1973) attribution concept, for more insights on causal attribution. Generally, Gyekye (2003) mentioned that a constant factor in

attribution models basically is the tendency of individuals to give explanations by logical assessment of the link between cause-and-effect variables.

1.2. Kelley (1967) attributional theory

Kelley's model of causal attribution (1967, 1973) is also known as the covariation model. He explains how people choose a cause over another when trying to explain why people and ourselves act the way we do. The application of co-variation in determining the attributed cause is a process whereby an individual uses the information obtained from various observations, at different times and conditions to perceive the linear relationship of an observed outcome and its causes. If the greater values of one variable (cause) correspond with the greater value of the other variables, the co-variation is seen to be positive, the same for variables with lesser values, which shows a negative covariance. Therefore, individuals apply rational and logical sense in making causal attribution and they attribute the cause of an action to the factor that has a closer co-variation with the action (Kelley, 1967). This process according to Kelley (1973) is known as the covariation principle which says that "an effect is attributed to one of its possible causes with which, over time, it covaries" (p.108). Kelley (1973) noted that these attributions of causes are based on both social and individual perception and can be internal or external. However, determining how true or correct an individuals' perception, judgements or evaluation of the world is, depends on when an individual can confidently make an actual attribution for a perception, judgement or evaluation. Kelley (1973) pointed out three criteria that determine the validity of the choices people make in attributing causes to events. These includes distinctiveness, consensus and consistency. These criteria are used as evidence for people in giving a causal explanation.

Firstly, distinctiveness entails if a person behaves in the same manner in a similar condition. For instance, Charlene always falls asleep in the class of a science teacher. In this case causal attribution is external but if she sleeps at any other time during school hours, the distinctiveness of such behaviour is very low. Secondly, consensus is the extent to which other people give similar judgement or behave in the same way in a similar situation. For example, if other students sleep when the science teacher is in the class, the behavior of Charlene agrees with others and in this case, the consensus is high and causal explanation is external. Lastly is the consistency criterion, which defines how consistent a person behaves overtime in the same situation. If Charlene only sleeps when the science teacher is in the classroom, the consistency of her behavior is high. Therefore, people make causal attributions of an incident or behaviour to a cause or individual when the three co-variation criteria are high. Kelley and Michela (1980) further developed the general model of attribution based on the work of Thibaut and Riecken (1955). They demonstrated the important components involved in attribution research. The sequence begins with the researcher's conception of the alternative explanation a naive subject may give concerning an event, conceived proposition of a researcher on what gave rise to the choice of attributed cause an individual makes concerning a given event and the hypothesis to understand the effect of this attribution on the subject. This idea on the general model of attribution is shown in figure 5 below:

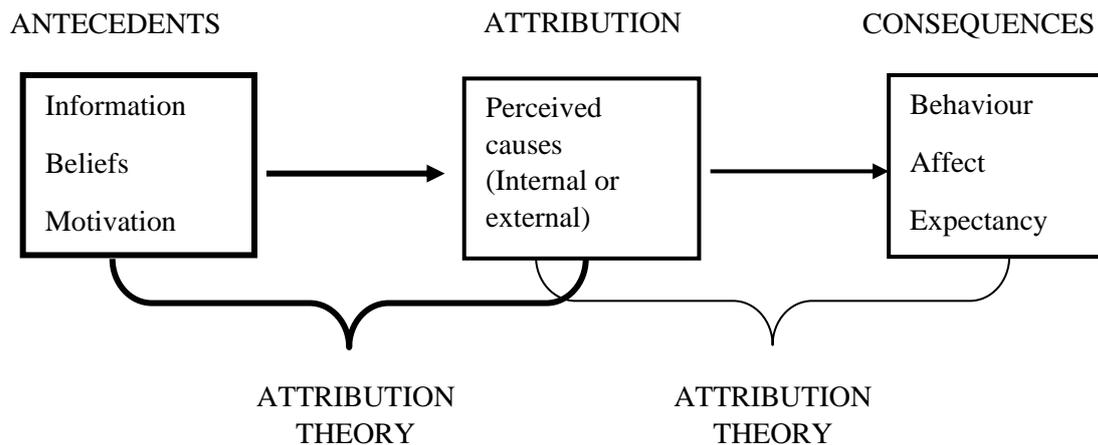


Figure 5: General model of the attribution field. Adapted from Kelley and Michela (1980)

1.3. Weiner (1979) attribution's theory model

A continuum from the work of Heider (1958) by Weiner (1979) indicates that the context of causal attribution focuses on the domain of helping and achievement. Weiner posits that an individual's causal attributions based on the success or failure of an event determines their future actions when a similar situation occurs, their emotions and their performances. Based on achievement, Weiner (2010) explains that people react emotionally (positively or negatively) to an event success or failure dependent on the causal inferences they make as reasons for their behaviour after an incident has occurred. According to Weiner (1979), the assumption that people strive to find causes for the success or failure of any event that has taken place in their lives, follow three dimensions which are locus of control (explaining the cause of any event as internal or external), stability of the causes (if the causes are stable or unstable over time and situation), and controllability (whether a perceived cause is controllable or uncontrollable

by oneself or others). To give an example across the three dimensions, if a worker attributes his failure to his incompetence, the attribution is internal but when he attributes his failure to lack of equipment, his attribution is external. The attribution is stable if the workers' incompetence is based on lack of capacity to learn, but unstable if it's a result of a situational factor like sickness because it was a temporary factor. On the other hand, when causal attribution is controllable the worker believes that he could do better by learning, but when the worker does not believe in his ability to improve, the cause is uncontrollable. Based on the theoretical concepts developed by Heider and subsequent attribution theory, Kouabenan (1999) initiated the model of Naive causal explanation of accidents to further justify how people attribute causes to events like accidents which in turn influences their actions with respect to risk and their prevention.

2. Kouabenan (1999) model of naive causal explanation of accident

2.1. Basic principles of naive accident explanation model

The model of naive causal explanation of accident by Kouabenan (1999) is an offshoot from the attribution theory of Heider (1959) which centers on the investigation of accident situations. While Heider discusses naive analysis of an action, Kouabenan (1999) speaks about naive causal explanations about accidents. The model recognizes the importance of naive causal explanations in accident analysis for the purpose of safety and prevention. Kouabenan (1999) emphasizes on the relevance of accident explanations given spontaneously by all stakeholders (lay people and experts) facing risk. Pointing out that these naive explanations of accidents can both clarify causal inferences about accidents, which can influence accidents and risk preventive measures. He further states that an event like accidents activates a search for explanation of the cause(s) which can

be directly or indirectly inferred. Moreover, naive explanations are important especially in negative situations, unusual and dramatic events like accidents. According to Kouabenan (2013) causal explanations of accidents are termed spontaneous or naive because they are given by individuals based on their internal representations and beliefs and not based on any precise method of investigation. Kouabenan (1999) also noted that these naive explanations of accidents given by experts and laypersons can be external or internal, controllable or uncontrollable. When individuals give internal explanations, they emphasize personal factors while external causal explanations are directed to factors outside the individual.

In addition, Kouabenan's (1999) model of naive causal explanations of accidents show that some variables can influence causal explanations and they include personal characteristics of the victims (hierarchical position, age, sex, degree of injury, degree of information, skills, culture, etc.), the characteristics of the accident analyst (degree of involvement in the accident, values, hierarchical position, sex, age and risk perception), the relationship between the analyst and the person involved in the accident (friend, colleague, superior, etc.), the severity of the accident and the circumstances surrounding the accident (work condition, economic situation, etc.). Basically, all these factors can affect causal explanation of accidents which in turn influences behavior of safety. Therefore, the interest in exploring naive explanations of accidents rests on its potential to expose human knowledge on the need for safety and psychological ease which will be elaborated on in the next paragraph. Figure 6 (p. 54) shows an overview of the model of naive causal explanations of accidents which identify the organizational and psychosocial factors that influence causal explanations.

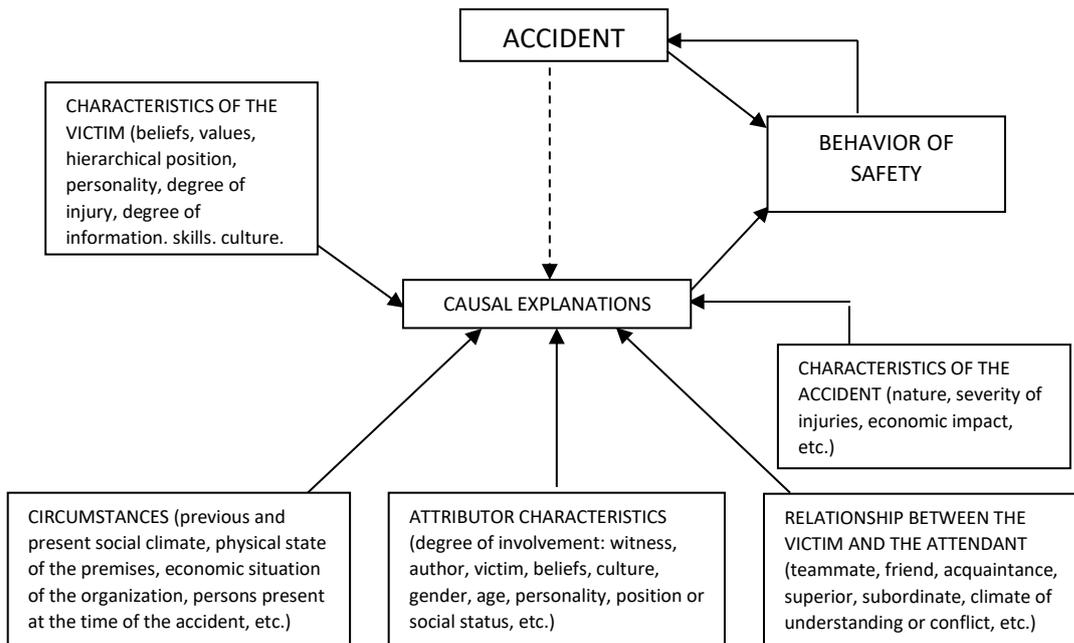


Figure 6: Model of the naive causal explanation of the accident adapted from Kouabenan (1999, p.77).

-----> Give rise to

-----> Can determine

2.2. Interest in studying naive explanation of accident

Attribution theory is a practical theoretical orientation which researchers (Gyekye, 2010; Gyekye & Salminen, 2004; Kouabenan, et al., 2001; DeJoy, 1990; Mbaye & Kouabenan, 2013, etc.) employs in empirical studies on causal attributions about accidents and its prevention. Kouabenan (2013) noted that lack of causal explanation arouses a state of temporary and unbearable psychological imbalance. Therefore, naive causal explanation is imperative because it provides explanations about causal factors relating to events, which reassures that one is not living in an unknown world with inexplicable circumstances (Kouabenan, 1999). According to Kouabenan (2009) naive explanation of accidents is an important concept to be considered in accident management and prevention as it provides salient and useful knowledge about accident situations at

the workplace. More so, Kouabenan (1999) mentioned that it is assumed that the process of causal explanation and accident prevention should concern all stakeholders facing a hazardous condition. This justifies the need to involve both experts and laypersons in analyzing accident causes because of their ideological differences (Kouabenan, 2013). This implies that, experts and laypersons' rationality differ and are sometimes contradictory. Therefore, it is crucial to harness everyone's opinion for better insight into accident causes without preference over anyone else's points of view (Gletty, 2017).

Regrettably, the process of evaluating accident causes and the formulations of prevention policies are mostly dominated by specialists (Kouabenan, 2013). Therefore, the people who will implement the preventive policies are rarely engaged in the process of causal analysis and designing of preventive actions. This may explain why some people engage in risky behaviour or why some preventive measures are ineffective. Moreover, Kouabenan (1999) discloses that professionals and laypersons can be subject to bias in their understanding of risk and in their causal explanations of accidents. For example, Kouabenan (2013) noted that the explanations provided by non-specialists could be biased because of their subjectivity, their cognitive limitations, their motivations, experiences and socio-cultural values. Also, experts are biased because they mostly rely on personal intuition especially when formulating hypotheses and designing the research, despite using scientific methods. Experts could be biased by their fundamental training, their subjectivity relating to their personal and professional experience, their motivations and their level of expertise skills. Nonetheless, Kouabenan (1999) noted that causal explanations, whether biased or not, are vital for accident prevention because recognition of these causal inferences offers the possibility of defining workable preventive strategies. Remarkably, Kouabenan (2013) advocates those causal attributions of all stakeholders

(workers, supervisors, managers and safety specialists) facing risk in their organization to a great extent, influences their behaviour concerning risk and accident prevention. As a result, the evaluation of the causes of accidents is an integral part of the formal analysis of risks and accidents. On this part, we believe that understanding Nigerian healthcare workers' naive causal explanations of accidents can shed light on accident causes in Nigerian hospitals and improvement on preventive measures.

Besides, the model of naive causal explanation of accident and prevention shows that personal representations like beliefs (fatalism) and individual characteristics are significant factors that promote our understanding of the variations in causal explanations of accidents Kouabenan (1999). This has been established by some authors who find that naive explanations can be influenced by factors like beliefs (Kouabenan, 1998, Peltzer & Renner, 2003), gender (Shaw & McMartin, 1977; Taylor & Kleinke, 1992), age (Melia, Chisvert & Pardo, 2001, Salminen & Gyekye, 2007), accident experience (Goncalves, et al., 2008; Kouabenan 2002) and the level of involvement in an accident (Kouabenan, 1985). These studies will be elaborated on in the next paragraphs.

2.3. Sources of variation in naive explanation of accidents

Causal explanation of accidents given by analysts either as a victim of an accident or as an observer, as an expert or lay person and as a supervisor or a subordinate, could all be influenced by some factors categorized by Kouabenan (1999) as organizational and socio-cultural determinants, individual determinants and accident severity. These determinant factors were further elaborated in the Kouabenan (1999) model of naive explanations of accidents. They are factors relating to the circumstance of the accident occurrence (examples: social climate, physical nature of the place, economic situation of

the organization), the characteristics of the accident (nature, severity of injuries, economic impact, etc.), individual characteristics of the victim (beliefs, values, hierarchical position, personality, degree of injury, degree of information, skills, culture, et) or the Socio-cultural makeup of the attributor (degree of involvement: witness, author, victim, beliefs, culture, gender, age, personality, position or social status, etc.). For the interest of our study, we will focus on some individual characteristics (beliefs, gender, age, accident experience, degree of involvement) and the severity of accidents.

2.3.1. Fatalism and naive explanation of accidents

Kouabenan (1999) captioned fatalism as a “culturally shared form of explanation” (p. 102). Moreover, fatalism as an element of culture has long been identified in both western and non-western societies. This was evident in the works of some psychologists (Hewstone, 1993, 1994; Morris & Peng, 1994) as reported by Kouabenan (1999). They show that bad events, catastrophes or natural occurrences are explained by invisible causes in different patterns, in traditional African communities or in Modern western societies. These causal explanations by unseen forces could be attributed to witchcraft, black magic or the presence of a stranger. Further studies have also shown that causal explanations could be influenced by fatalistic beliefs. For instance, Kouabenan (2013), observed that “fatalistic participants generally tend to attribute accidents to external and uncontrollable factors, outside the control of drivers (infrastructure, others, fate) while minimizing the role of factors involving their initiative (sudden change of direction, reckless, failure to comply with stop signs, pedestrian’s contempt, impatience, etc.)” (p.52). Peltzer and Renner (2003) reported that individuals who have strong fatalistic beliefs, explain accident causes as bad luck. This depicts that people who share the same cultural orientation, like fatalistic beliefs, are likely to see and

explain things in the same manner. Notwithstanding, Kouabenan (2013) noted that explaining accidents from fatalistic view, could depend on educational level, but even more on how an individual relates to accidents. Nevertheless, persistent and repeated exposure to catastrophes and social distress can reinforce such beliefs (Kouabenan, 2013). Therefore, it would be interesting to know how workers in Nigerian health sector who share the same cultural view or beliefs explain accidents and how it impacts on their undertakings. Moreover, control beliefs which can also be referred to as a sense of control or perceived control over risk is also a factor of variations in causal explanations of accidents.

2.3.2. Perceived control and naive explanation of accident

Studies on the relationship between the causal explanation of accidents and control beliefs mostly demonstrate that a high sense of control over risk induces internal causal explanations of accidents. For instance, Kouabenan (2013) found that drivers who feel they can control accidents better than other counterparts, explain accidents by personal causes more than factors in the environment. In addition, Ngueutsa (2012) found that road users with high control beliefs such as ability to cope with dangerous driving situations attribute accidents to more internal causes to the victim. Besides, the study by Gletty (2017) reveals that the stronger the practitioners of off-piste feel they can manage the risk of avalanche, the more they give explanations internal to the victim (lack of technical competence and experience). While fatalism and control beliefs seem to be strong determinants of causal explanation, other studies have also shown that individual characteristics like gender and age are factors that can influence causal explanation provided for accidents. We will explore the relationship between these personal factors and causal explanations of accidents starting with gender.

2.3.3. Gender and naive explanation of accidents

Much work has not been done in establishing the influence of gender on causal explanation of accidents. Meanwhile, Kouabenan (1999, 2013) and Kouabenan and Ngueutsa (2016) indicated that outcomes of various studies on the role of gender on causal explanation are inconsistent and sometimes complicated. The study by Shaw and McMartin (1977) and Taylor and Kleinke (1992) showed variations in causal attribution based on sexual identity, which reveal that women provide more internal explanations to the victim while men give more external causal attribution to victims. Moreover, study by Kouabenan et al. (2001) show that men give more external causal explanation than do women. Some other studies (Baldwin & Kleinke, 1994; Kanekar & Sovani, 1991; Kouabenan et al., 2011) did not find any of these effects. It will be imperative to consider gender as an important factor in causal explanation of accidents. Bearing this in mind, we can predict that female healthcare workers will provide more personal causal attributions than men while also considering differentiating factors of relevance that could influence causal explanations. Apart from gender, age is also regarded as a determinant factor in causal explanation of accidents.

2.3.4. Age and naive explanation of accidents

Age has been identified as a factor that can influence causal explanations which is also a source of bias that could produce a defensive causal attribution (Kouabenan, 2013). Kouabenan noted that younger ones and adults' reason differently in providing naive explanations. This indicates that adults take causal explanations given by younger individuals to be unreasonable. Kouabenan (2013) mentioned that attribution of personal responsibilities is stronger when the actor is advanced in age.

On the other hand, Gyekye's (2010) review on causal explanations in organizations recognized that older workers provide more external causal explanations than younger workers who explain accidents more by internal causes. Equally, older supervisors are likely to explain accidents by external and unexpected causes while younger supervisors give more internal explanations. This effect was recorded by Niza, Silva and Lima (2008) confirming that older and more senior employees give more external and unpredicted forms of explanations than younger and junior colleagues. Additionally, apart from gender and age, studies have shown that accident experience can influence naive causal explanations of accidents.

2.3.5. Accident experience and naive explanation of accidents

The role of accident experience on causal explanation of accidents is mostly divergent. Kouabenan (2002) found no significant relationship between the causal explanations of accidents given by victims and non-victims. He notes that being a victim of an accident does not influence one's representations of risk and accident explanation rather the individual's attitude towards being careful and effort to avoid accidents in the future (Kouabenan, 1999). In the same direction, the result of the study by Nguetsa (2012) shows no significant interaction between causal explanation and accident experience contrary to the speculations that accident experience will reinforce causal explanation. However, Kouabenan (1985b) observed that accident victims give more causal attributions to external factors than do non-victims. Additionally, Gonçalves et al. (2008) found that accident experience significantly correlates with external causal explanations and unsafe behavior but correlates negatively with internal explanations. This shows that being a victim of an accident can inspire one to give causal explanations that relate to factors in the organization rather than on responsibilities of the actor in the

accident. They equally found that external causal explanation is intensified with increased number of accidents a victim experience. The study of the relationship between experience of work accidents and workers causal explanation by Niza et al. (2008) reveals that victims attribute more causes to external uncontrollable factors and to factors relating to the organization. In addition, Stewart (2005) recorded that accident victims tend to attribute responsibility to other drivers more than their own and to provide external explanations like the state of the road or weather conditions. On the other hand, Gletty (2017) study on the relationship between avalanche accidents off-piste and causal explanations discovered that victims of avalanche accidents explain accidents more by internal causes (lack of knowledge and training) compared to non-victims of avalanche accidents. Generally, accident experience has been mostly speculated to invoke external explanation which incites insecure behavior. Hence, we will seek to find if accident experience interacts with causal explanation to influence behaviour. Aside from individual socio-demographics (gender and age) and accident experience, the seriousness of an accident is also a factor in variations on causal explanation of accident.

2.3.6. Severity of an accident as a determinant of its explanation

Seriousness of an accident is a factor that cannot be neglected in accident analysis and prevention because it tends to generate an in depth and more detailed search about the accident. Kouabenan (1999) notes that accident severity is not passively treated like a minor accident. More effort is dedicated to analyzing a serious accident than a less severe one. The author also notes that outcomes of studies on causal explanation and severity of accidents are sometimes positive and, in some cases, negative which shows no significant relationship. Some studies (Baldwin & Kleinke, 1994; DeJoy & Klippel,

1984) that found a significant effect on accident severity and causal explanations reviewed by Kouabenan (2001) shows that internal causal attribution to the victim increases when the seriousness of an accident increases. This is same with an experiment by Waslter (1966) which showed that more responsibilities were attributed to a victim (as being responsible and reckless) when the accident is severe than when it is minor. Walster further explains that when accidents are less serious, people easily explain them by uncontrollable and external causes to the victim (bad luck). They believe that such accidents can happen to anyone by chance without that being their fault. But serious accident situations are explained by controllable factors internal to the victim.

On the contrary, Salminen et al. (1992) observed that dreadful accidents are associated with more factors relating to the organization and colleagues (i.e., external explanations to the victim) but less to work procedure in non-fatal accidents. According to Walster (1967), less liability is likely to be attributed when the accident is severe. Some other studies as Kouabenan (2001) reports, did not find any effect between causal explanation and accident severity (Kanekar & Sovani, 1991; Shaver, 1970a). Moreover, naive causal explanations of accidents have been an important factor in understanding behaviour. In the next paragraph, we will explore how people's causal attributions can influence their actions.

3. The implication of naive explanations on safety behaviors and accident prevention

Gyekye (2003) asserts that recognizing the fundamental causes of accidents provides knowledge that guides workers behaviour at the workplace. Moreover, Kouabenan (2013) notes that biases in naive causal explanations of accidents could

explain the differences in individuals' precautionous attitude. These variations in behaviour of safety could be that preventive measures are rejected at first contact, or that unsafe behaviour was adopted. In the same vein, Ngueutsa (2012) noted that biased causal explanations can induce risk taking and inappropriate behavior or poor adherence to recommended safety measures, since laypersons and experts differ in their sense of judgment. In essence, the way people explain accidents affects their actions towards accident prevention. In view of this, Kouabenan (2013) states that a worker who attributes accidents to fate or uncontrollable external factors is likely not to actively engage in prevention procedures. The study by Goncalves et al. (2008) demonstrates that naive explanations can influence behavior. Authors invited 559 and 335 participants from 2 different organizations to find the effect of accident experience on future behaviour and the mediating role of causal explanations. They establish that participants who have experienced accidents attribute the incidents to causes more external and practice unsafe behaviour. This shows that causal attribution of accidents to uncontrollable and external factors leads to insecure behaviour and poor safety attitude that can give rise to future accidents.

Conclusion

The study of naive causal explanation of accidents has been found to be a useful concept in application for accident analysis and prevention (Kouabenan, 2013). It is noted that serious accidents require more and tedious enquiry to establish possible causes of the accident which will be of importance in averting a future occurrence. Carrying out these searches is made easier and vast in knowledge about an accident by recognizing the naive causal explanations of both laypersons and professionals (Kouabenan, 1999). Ordinary

people have their own perceived causes of accidents just like experts do. Therefore, harnessing the points from both categories is a step forward to understanding accident situations, individuals' inclination towards risks and accidents and accident prevention measures.

Equally, it is important to note that explaining accidents from an individual's internal makeup, affects visibility of the external factors thereby causing an underestimation of the situational elements (Kouabenan, 2005). The concept of external and fatalistic paradigm in accident explanation has also extended the possible factors that support the rationale of the variations in an individual's explanation of accident. It has been generally noted that internal or external causal explanations are usually defensive (Kouabenan, 1999; Kouabenan et al., 2001) which is often exhibited when the analyst in one way or the other is involved or when the person explaining the accident has no emotional attachment with the victim, thereby giving an internal explanation to show that the victim is the cause of his own problem. A remarkable analysis of the defensive nature of accident explanation which drives external causal explanations is reported in a study by Kouabenan and Guyot (2004) on spontaneous explanations in accidents, it showed that both motorist and pedestrians' explanations were defensive. Therefore, subjective characteristics of subjects in accident explanation may also result in bias and in one way or the other affects safety behavior and risk actions. A summary of the findings by Kouabenan (2002) showed that people's defensive explanations of accidents are as a measure to maintain their dignity and to avoid being held responsible. Hence, there is a need to harness the different explanations given by workers to better understand their view about accident causes and what is more important to them in risk and accident analysis. Additionally, apart from naive causal explanations of accident as a concept in

accident analysis and prevention, risk perception has also been identified as a psychological phenomenon that influences safety behaviour. This will be discussed in the next chapter 3.

Chapter 3: Role of Risk perception in the analysis of safety behaviour

Introduction

In chapter 2, the concept of causal explanation of accidents was explored, and naive causal explanation was identified as a cognitive factor in risk and accident assessment, considering their roles in safety behaviour. In this chapter, we will examine the phenomenon of risk perception as another socio-cognitive construct in accident analysis and its role on precautionous attitude in the face of risk. Therefore, we will explore the various concepts that are built around perception of risk towards risk analysis and prevention owing to behaviour at work, beginning with 1) understanding the complications in defining and assessing risk, 2) understanding the construct of risk perception, 3) recognizing the various determinants of risk perception, 4) the factors of biases and illusions in perception of risk, and 5) the link between risk perception, causal explanation and safety behaviour.

1. Complexity in definition and assessment of risk

Risks are part of human daily life from simple activities (eating, climbing stairs, cooking, and lifting heavy objects) to more complex ones (driving, mining, technological works, or any organizational work like healthcare activities etc.). However, the meaning and definition of risk is very variable making it complex to define or assess. In essence, the difficulty with the notion of risk is based on the disparities in its definitions. Basically, risk exists in different dimensions such as environmental risks (e.g., electrical hazards, chemical splash, and landslide) or health risks (e.g., hepatitis, tuberculosis, HIV etc.).

These diversities in nature of risk according to Yates and Stone (1992) could contribute to the complications in its definitions as well as the degree of its effects. .

Besides, Cadet and Kouabenan (2005) noted that risks can be defined according to an individual's or group's acceptability of a hazard. What seems to be a catastrophe to an individual or a group may not be the same for another. This risk acceptability according to Slovic (1987), is primarily based on the benefits offered by the risk and that people have the tendency to accept risks when it is taken willingly. Gletty (2017) added that these values attached to a risk may change over time, from one group to another. As a result, some risks that were once accepted are less tolerated today, leading to increased fear and overestimation of risk and passivity (Ngueutsa, 2012). Therefore, the choice of defining risk is subjective which depicts an expression of an individual's or group's opinion regarding the significance of the negative effects in a particular condition (Fischhoff et al., 1984).

Additionally, Fischhoff et al. (1984) stated that objectivity is an important point of controversy in the definition of risk. Objectivity according to Fischhoff et al. (1984) in risk definition refers to the disagreement on how risk is being characterized by both the laypersons and the experts. By this, they mean that experts try to differentiate between objective and subjective risk. The objective involves the outcome of scientific inquiry like public health statistics, analysis of risk probability or experimental studies. While the subjective aspect refers to laypersons' perceptions about risks and other personal considerations about the risks. Fischhoff et al. (1984) mentioned that it may be common to adjudge public opinion to the reason of their ignorance or irrationality, but an in-depth examination of the discrepancies in definition suggests a more complex situation.

Therefore, to define risk, Cadet (2001) noted five properties inherent in risk characterization for a more structural and functional approach to understanding risk. These include presence of several active variables that emanates from multiple information provided; the need to integrate available information from multiple choice; presence of uncertainties; the presence of objectives and constraints that explains admissible risks based on achieved positive objective and the property of the assessment of risk effects of both short term and long term. Moreover, Van der Pligt (1996) noted that the unifying concept in risk definition is its likelihood and severity. Hence, we will look at some definitions of risk from different scholars to observe how these properties in risk characterization are operationalized in risk definition.

According to Rosa (2003) risks are situations with uncertain consequence(s) which threatens humans and things beneficial to people. According, Chicken and Posner (1998), risk can be explained based on its elements of threat and vulnerability. Threat or hazard is the ability of a risk to cause harm while vulnerability is the degree at which an individual can be harmed by the risk. Fundamentally, risk evaluation is important for quantifying risk severity, its probability or the level of control exerted to mitigate risk. According to Kouabenan (2006d), these characteristics are dimensions through which risk can be perceived.

Moreover, Kouabenan and Cadet (2005) mentioned that risk assessment can be “objective (normative, probabilistic, or criterion-reference) or subjective (spontaneously formulated by individuals based on their representations or beliefs)” (p. 61), which inversely influences risk assessment and preventive actions (Kouabenan, 2000b). On this premise, Kouabenan and Cadet (2005) stated that perception and evaluation of risk are not always approached by analytical methods but could also be subjective based on

individuals' representations. Therefore, analysis of individuals' risk perception can aid our understanding of the behavior of healthcare workers in Nigerian hospitals. In the subsequent subtopics, we will have an overview of the concept of risk perception, the definition of risk perception, the various models that explain how risk perception can be evaluated and the various factors that can influence individuals' perception of risk and how risk perception can influence safety behaviour.

2. Understanding the concept of risk perception

Ulleberg and Rundmo (2003) defined risk perception as a subjective evaluation of the possibility of an event causing damage. According to Kouabenan (2006d), subjective evaluations of risks could take different dimensions that are inherent in risk characteristics. They are risk perceived probability (the chances of encountering a given risk), the perceived severity (the extent of the harm that could result from a risk) or perceived controllability (an individual's perceived control over a given risk). Likewise, according to Cadet and Kouabenan (2005), these risk characterizations are defined within the context of three main paradigms which aids our understanding of the role of perceived risk on health behaviour. They include paradigm of expected utility, the psychometric paradigm and the cognitive paradigm (Cadet & Kouabenan, 2005). We will rely on the model of Expected utility and the psychometric paradigm to explain the cause-and-effect processes in risk perception. This is justified by the fact that the two paradigms according to Cadet and Kouabenan (2005) are “focused on the study of an established assessment, "stabilized" result of a set of processes” (p. 23).

2.1. Paradigm of expected utility (EU)

Expected utility model of risk perception stems from the economic and financial evaluation of risk whereby positive or negative consequences are evaluated for decision making in the face of risk. Moreover, this model of risk analysis is based on the probability of risk occurrence and the severity of its effect. Shanteau and Pinget (2009) used the term subjective expected utility and they defined it as a way whereby decision is taken in the face of a risky situation, taking into consideration the subjective assessment of the variables involved and their probability of occurrence, including the consequences of such risky situations (Treich, 2008). Cadet and Kouabenan (2005) mentioned these risk consequences as “accidents, incidents, errors, failures, loss of state, property, opportunity” etc. (p. 12). They also mentioned that the situations create an avenue for evaluation and decision making. Van der Pligt (1996) noted that health models are established on decision theory given the assumption that unsafe behaviour represents conscious actions. Therefore, the act of taking decisions is the main purpose of the expected utility paradigm in risk analysis. The decision taken by the decision-maker can be either to maximize the possible advantages of the decision made or a reduction of the anticipated losses (Cadet & Kouabenan, 2005). This is operational in the mechanisms for curtailing risk and in evaluating situations that confront people with the choice of decision making.

2.2. Psychometric paradigm of risk

According to Slovic (1987) psychometric model of risk is based on a combination of both the subjective analysis and scaling methods, to achieve a quantitative description of cognitions of risk perceptions and attitudes. Although Starr (1969) noted some

limitations of the model, notwithstanding, its application has been found useful by researchers in eliciting perceptions and individuals' choices. For example, Slovic (1992) established that the differentiating characteristics of their studies is as a result of their application of the various Psychometric measures, which enables them to realize quantified measures of risk perception, its perceived benefits and other subjective characteristics of the risk (it's probability of occurrence). For instance, Starr (1969) was the first researcher to apply the psychometric approach to risk in his research "how safe is safe enough" (Fischhoff et al., 1978; Ng & Rayner, 2010). He used the economic data to quantify the acceptable risk and the benefits of any action taken. He studied peoples' cognitive make-up of risk and assumed that people have full information about risk and make decisions based on that. Starr also had the assumption that every risk accepted by the people is an acceptable risk. Slovic (1992) expressed concern for these assumptions, pointing out that Starr's modus operandi does not explore the individual preferences for different kinds of risk. To bridge the gap, Slovic (1992) carried out the same study as Starr but explored the individual preferences for various forms of risks. The objective of his study was met because the research was able to extract the preferences people had concerning the various risks and the different aspects of risks. Nevertheless, researchers like Ng and Rayner (2010) argued that cognitions alone are not adequate to measure risk perception, that peoples' culture and their social values are important in explaining risk perception. On this basis, Slovic (1992) went beyond questions about risks and its benefits to include the subjective characteristics of risk. By this, he established the capability of risk attributes (its capability of causing harm, its controllability, voluntariness, etc.) in influencing risk perception and its acceptance. Therefore, well designed and appropriate psychometric instruments are useful in giving quantified descriptions of risk perceptions

and attitudes based on individual responses (Slovic, 1992). Using a psychometric approach, Siegrist, Keller and Kiers (2005) replicated the studies of Fischhoff et al. (1978) based on attitudes and their results supported the findings that, 'dread' and 'unfamiliar' risks can influence risk perception. Siegrist et al. (2005) also pointed out that "cognitive map" is devoid of the justification to explain risk perception on an individual basis, which existing publications lack the proof to defend. With this, they further carried out research within the framework of the psychometric paradigm, to include individual differences (gender, general trust and general confidence) as part of the factors that influence risk perception. Their results show that individual differences are also capable of affecting risk perception. Although not all variables that make-up the individual differences showed a positive result, the majority were positive. Therefore, they suggest that exploring various methods can unveil more insight in understanding the cognitive representation of risk. Further, it has also been observed that people's beliefs can influence their risk perception. Example, a study by Ngueutsa and Kouabenan (2017) showed that fatalistic beliefs can affect risk perception. Using a sample of 525 road users, their analysis showed that fatalistic beliefs inhibit the perception of risk which negatively affects safety behavior. From the studies mentioned on psychometric approach, we will deduce that apart from cognition, other factors have demonstrated that risk perception can be subjective. On this basis, Mannan (2012) remarked that subjective factors (culture, personal experience, religion, etc.) have formed the basis on which people build their risk acceptability. Generally, the model of expected utility and the psychometric paradigm have given a boost to studies in establishing quantitative evaluation and characterization of risk and risk perception.

3. Determinants of risk perception

The subjective approach to analyzing risks is dependent on two categories of factors that could influence risk perception. According to Kouabenan and Cadet (2005) and Kouabenan (2006d) they are factors relating to the risk itself and the characteristics or personal attributes of the risk perceiver.

3.1. Characteristics of risk as determinants of risk perception

Subjective assessment of risks according to Kouabenan (2006d) is linked to risk characteristics which are considered as factors responsible for differences in risk perception. These are: risk familiarity, the nature and severity of risk consequences regardless of the nature of its source, either voluntary or involuntary and the level of publicity of the risk, risk capability of causing accidents (number of people affected), its chances of occurrence and its perceived controllability, to mention but a few. Concerning risk familiarity, authors like Kouabenan (2001a) and Kouabenan and Cadet (2005) observed that there is a tendency to underestimate familiar risks, less catastrophic or voluntary risks while unfamiliar, involuntary and catastrophic events are perceived as very risky. Like in the study of Kouabenan et al. (2007) on perceived risk of Methicillin-Resistant *Staphylococcus Aureus* (MRSA) by health personnel, although healthcare workers perceived the risk of MRSA contamination, certain subjective factors such as experience and familiarity, led to their underestimation of the risk. Notwithstanding, Kouabenan (2006d) records that when risks are taken consciously out of one's volition such as smoking, it is likely to be underestimated unlike involuntary risk, like living close to a chemical industry. In addition, Kouabenan (2006d) remarks that the underestimation of the risks that are taken voluntarily could be explained by one's perceived controllability

of the risk as controllable risks tend to be underestimated compared to uncontrollable or difficult to control risks.

Furthermore, the nature and severity of risk consequences influenced by media coverage, perceived as uncontrollable, can influence individuals' risk perception. For example, Kouabenan (2006d) states an example with the level of damage caused by plane crash, the number of people affected at once in the accident and increased publicity about the plane incident elevates peoples' perception of the severity of such risk which influences its assessment. Meanwhile, risks that happen frequently with severe outcomes which involve a small number of victims at a time are underestimated. This was confirmed in a study by Gigerenzer (2004). He analyzed the risk perception of Americans on the use of planes and driving following the September 11, 2001, terrorist attack involving three planes. Gigerenzer found that catastrophic potential of a risk that is not regular (considering the number of large numbers of people involved) and the publicity of such risk, increases risk perception even when the less perceived risk like driving does more harm. The author noted that more people used cars than planes after the 2001 incidence but the number of deaths from traffic accidents between the months of October-December 2001 was higher than the fatal traffic accidents recorded in the previous years before the 2001 incidence. Beyond the attributes of risks as determinants of risk perception, individual or personal characteristics of a risk perceiver are also factors that can influence risk perception. These individual characteristics and their contribution to risk perception will be discussed in the next paragraph.

3.2. Characteristics of the risk perceiver as determinants of risk perception

Risk perception can vary based on personal characteristics of the one who perceives the risk. According to Kouabenan (2006d), these individual factors includes demographics or psycho-sociological variables (age, sex, experience, level of involvement in the situation, etc.); or through evaluation of one's exposure and ability to cope (perception of one's skills, perception of the person's own vulnerability to it, perception of the precautions taken and control efforts, etc.); also by the socio-organizational variables (social or hierarchical position, role or involvement in the organization, social norms and pressures of the group to which they belong, etc.). Kouabenan (2006d) indicates that the variations in risk perception depend on the value placed on each of the different factors.

3.2.1. Professional experience and risk perception

Indeed, studies have shown that knowledge gotten through work and life experience could affect one's risk perception (Kouabenan, 2002; Rutter et al., 1998). The influence of work experience on individuals' risk perception may be because of the nature of their work whereby they are confronted daily with risk. Although the outcome of studies on work experience and risk perception is not consistent, this requires further justification. Notwithstanding, Kouabenan (2002) in a study on occupation, driving experience, and risk and accident perception, found that people who are more experienced have higher perception of risk. On the other hand, Kouabenan et al. (2007) health study on work experience and perception of Methicillin-Resistant *Staphylococcus Aureus* (MRSA), established that health personnel with longer service years are likely to trivialize

the risk of MRSA than workers with less work experience. This also agrees with Dejoy (1989), that younger drivers envisage more the risk of a road accident as a result of their poor driving experience, while the optimism of accident occurrence remarkably decreases with more experience. Going in the same direction, Rutter et al. (1998) observe that the more bikers gain experience, the less they perceive the risk of being a victim of road fatal accident and injury. Consequent upon the outcome of these studies, we can expect that healthcare workers' perception of hospital risks can be influenced by the number of years they have spent at work. Moreover, apart from professional experience, accident experience is another source of possible variation in risk perception. This will be discussed in the following sub-heading.

3.2.2. Accident experience and risk perception

Studies have established that being a victim of an accident is mostly associated with overestimation of risks. For example, Kouabenan et al. (2003) indicates that the experience as an accident victim of contamination with *Staphylococcus aureus* increases an individual's perceived vulnerability of the risk and to other risks present in the hospital surroundings. In the same line, Kung and Chen (2012) research on earthquake experience found that those who are survivors of earthquakes have a greater risk perception of the danger of such risk than people who have not experienced an earthquake. According to Gletty (2017), avalanche accident experience is associated with greater perceived probability and perceived controllability of the avalanche. This is explained by the fact that practitioners who have been involved in avalanche accidents, anticipate that they could encounter this form of accident again than those who have no accident experience. This was the same outcome with the study by Leiter (2011) on risk perception and avalanche accident. He found that having been involved in an accident, increases the

chance of overestimating the risks associated with avalanche. On the other hand, Gletty (2017) found that no accident involvement is positively related with perceived risk severity and negatively related to perceived risk controllability. Hence, individuals who have not experienced an accident have high perception of the accident severity and perceives the risk as uncontrollable.

Nevertheless, some studies have established a negative relationship between accident experience and risk perception of accident severity. This means that being a victim of a risk or experiencing a serious accident does not increase perceived threat of such risk. For example, Lindell and Perry (1990) studied the Effects of the Chernobyl Accident on Public Perceptions of Nuclear Plant Accident Risks. The outcome of their survey with 69 residents of southwestern Washington demonstrates that “experience with a major accident can decrease rather than increase perceptions of threat”. Likewise, Ngueutsa and Kouabenan (2017) found that involvement in accidents lowers perceived risk of road travel and the more an individual encounters accident, the lesser their risk perception about road accidents. Their study with 525 road users in Cameroon revealed that road users who have experienced more than three accidents or those whose accidents were severe, perceived the risk of road travel as less risky than other road users. Going by the number of accident occurrences, the study confirms that road users with more than three accident experiences adopt unsafe behaviour compared to others. Based on these results, the implication according to Ngueutsa (2013) is that being a victim of an accident tend to lead to overestimation or underestimation of risk; it all depends on the time and the regularity with which one is exposed to the risk. These variations in the relationship between risk perception and accident experience requires further verification. Therefore,

we can assume that healthcare workers' accident experience can play a role in their risk perception.

3.2.3. Gender and risk perception

Several studies on the subjective elements in risk perception like Finucane et al. (2000) and Hogarth et al. (2007) have demonstrated that gender is an important source of variation in risk perception. Basically, Gustafsson (1998) notes that “different methodological approaches give different, at times even contradictory, pictures of such gender differences” (p. 806). Nonetheless, Cutter et al. (1992) points out that considerable psychometric study on risk show that men are more involved in risks. Therefore, it can be asserted that men’s familiarity with risks could likely instigate them to perceive risks as less terrifying than women do. To support these assertions, the outcome of a review of quantitative studies on risks by Gustafsson (1998) shows that men tend to trivialize all the various risks that were studied. The study by Rhodes and Pivik (2011) on the effect of gender differences on unsafe driving considering the role of risk perception, indicates that female drivers perceive greater risk of risky driving behaviors than male drivers, whereas male drivers reported engaging in risky driving behaviors more frequently than female drivers.

Studies have demonstrated that women perceive risk as more probable (Rundmo & Iversen, 2004; McCool et al., 2009) and more serious than men do (Gustafsson, 1998). This explains that women are more optimistic about their chances of encountering an accident than men are and in the event these accidents occur, women perceive their consequences to be severe. For example, McCool et al. (2009) carried out a survey involving 3371 beachgoers (56% women and 44% men) to examine their perceived severity and perceived vulnerability to the risks associated with beach swimming and to

compare these risk dimensions based on gender. They established that female respondents were more likely than males to perceive greater severity and vulnerability of the risks associated with beach swimming. The same findings were recorded by Dejoy (1992) which confirms that men perceive risky driving behaviors as less serious and less likely to cause an accident. Dejoy also found that men have stronger optimism about their driving ability. Equally, in a study by McCool et al. (2009), they observed that men reported higher perceived controllability than women do (perceived ability to take actions that can significantly minimize the risk).

Furthermore, on gender as a factor in perception of risk probability, Susanto et al. (2018) study on the link between gender and risk perception among mountaineers established that women scored higher in their perception of risk probability and as well in other risk dimensions. Accordingly, Rundmo and Iverson (2004) established that women perceived a higher probability of an accident happening to them than men do. Meanwhile, Dejoy (1992) has proved that men and women have similar perceptions of the probability and frequency of risk as against other studies' outcome. Additionally, Dejoy (1992) pointed out that men have a stronger optimism about their driving skills and perceive likelihood of their behaviour to cause accidents. This men's perception of their skill could explain the reason they trivialize the probability of a risk causing accident. Apart from gender as a determinant factor in risk perception, age has also been indicated as a factor of variation in risk perception.

3.3.4. Age and risk perception

Kouabenan and Ngueutsa (2015) remarked that numerous studies have reported differences in risk perception based on age. Pointing out an indication that younger folks perceived risk is mostly explained by their capacity to face risks. Boyer (2006) equally

noted that risk taking is mostly associated with younger people than older ones. However, Jonah (1986, cited by Kouabenan & Ngueutsa, 2015) indicated for example, that young drivers are mostly involved in accidents as a result of their ability to take risks while driving. Their high involvement in accidents could be explained by their overestimation of their capabilities and underestimation of risks. Colbeau- Justin et al. (2008) noted that young people have poor ability identifying risks, and at the same time, they have a higher feeling of mastery than older age groups. Moreover, according to Kouabenan (1999), younger people have poor perception of traffic situations, which could explain why there are so many victims of accidents among young adolescents.

Citing some studies on age and risk perception, Jonah (1986, cited by Kouabenan & Ngueutsa, 2015) affirms that young drivers' risk-taking is linked to their low perceived probability of the risk. They believed that they are less likely to encounter accidents than older ones. In the same line, Otani et al. (1992) carried out a study to examine the possible age differences in risk perception considering three age groups with regards to their perception of risk when a warning sign is ignored and their estimates of the likelihood of neglecting a warning sign. Their results established that older adult tend to think it riskier to ignore the warnings. This demonstrates that adults had higher perceived risk of ignoring safety warnings than younger ones, since there is a high possibility of encountering an accident when a warning sign is neglected. The authors equally established that the older participants were less willing to disregard the signs than the younger participants. Additionally, McCool et al. (2009) found that older beach goers reported higher perceived severity and vulnerability of risk than younger ones.

Additionally, some other studies (Assailly, 2006; Field & Schreer, 2000) have found an opposing outcome, showing that risk perception decreases by age. Therefore, it

holds the view that older ones worry less about risks than the younger ones. On the other hand, other researchers did not find any significant variation in risk perception and age (Field & Schreer, 2000). This finding of no age difference in risk perception denotes that people of all ages share the same level of perception of how much risk is associated with each of the behaviors studied. Out of the six behaviours studied (alcohol, computer, seatbelt, skiing, smoking, and soccer), a significant difference in risk ratings by different age levels was found only for skiing. These variations signify the importance of further studies on risk perception and age. Therefore, it is imperative to investigate how adolescents perceive risk and compare their own likelihood of risks with that of older subjects. Ideologically, risk perception could be biased based on these individual characteristics. For example, Kim et al. (2018) indicated that perception bias can be linked to age and gender. In the next paragraph, we will explore some of these biases and how they influence perception of risk.

4. Influence of risk perception on safety behaviour

Brewer et al. (2007) noted that the link between risk perception and safety attitude on health precautionary measures are not certain. The outcomes of these interaction according to Kouabenan (2006d) are not consistent. While some researchers found that perceiving risk is positively and significantly related with involvement in work safety actions (Simsekoglu et al., 2013) and road safety attitudes (Ram & Chand, 2016), some others on the contrary affirms that there is a negative relationship between risk perception and preventive behavior (Ma et al., 2010). Stating examples of studies that found a positive relationship on perceived risk and involvement in safety management, Kouabenan, Ngueutsa and Safiétou (2015) studied the link between perceived risk of

supervisees and involvement in safety management of 63 first line managers' participants, the authors observed that first line managers who engaged in safety management perceived risk of operators as highly probable and serious. Similarly, in a study with 213 Turkish and 254 Iranian drivers, Simsekoglu et al. (2013) found a relation between traffic and non-traffic risk perception and drivers' behaviour. Turkish participants showed greater perceived frequency (probability) of traffic and non-traffic risk and they reported less violation of driving rules. While Iranian counterparts perceived less risk and reported higher violations of driving rules like lower levels of seat belt use. In the same direction, the research by Ram and Chand (2016) reveals that higher risk perception improves road safety attitude among drivers. Equally, a study with 525 road users in Cameroon on the influence of perception of riskiness of road travel and traffic safe behaviour, Ngueutsa and Kouabenan (2017) demonstrates that perception of risk positively correlates with safety behaviour. This suggests that participants who perceive high riskiness of road travel adopt road safety behaviour. The analysis also established that the effect of the number of accidents on safety behaviour was partially mediated by risk perception (high risk perception reduced the negative effect of the number of accidents on reported safe behaviour). More so, the study by McCool et al. (2009) with 3371 beachgoers found a link between perceived risk severity, perceived vulnerability of drowning oneself, perceived effectiveness of prevention measures (response efficacy) and safe swimming behaviour. The results show that "people who perceived a greater threat (in terms of severity) of having trouble while swimming at a beach were more likely to report safe swimming behavior. Also, participants who reported higher response efficacy (beliefs about the effectiveness of drowning prevention measures) were more likely to report safe swimming behavior" (p. 365). Additionally, we recorded a significant relationship

between risk perception and health behaviour of being vaccinated in a meta-analysis study by Brewer et al. (2007). They included 34 studies with 15,988 participants to test perceived likelihood of illness, perceived susceptibility of illness, perceived illness severity and safety health behaviour of getting vaccinated. Their results demonstrate that higher perceived likelihood, perceived susceptibility to an illness and perceived severity of an illness predicted the likelihood of getting vaccinated. They also found that several factors moderated the relationship of perceived risk likelihood and severity to vaccination behavior; this was seen in the large effect sizes.

The various studies mentioned evidently indicate the link between perceived risk and adoption of safety behaviour. Nevertheless, some studies show that the outcome of the relationship between risk perception and health safety behaviours are not significant. This indicates that perceiving risk does not predict adoption of precautionary behaviour. Moreover, in a meta-analysis on the relationship between risk perception and health behavior, Brewer et al. (2007) stated that “although most empirical studies find positive associations between risk perceptions and behaviors, as many theories suggest, individual studies report all types of relationships: positive, negative, and none” (p. 136). For example, Lund and Rundmo (2009) found that Ghanaian participants’ higher perceived risk of various hazards including traffic risk did not predict their driver behaviour. We can also mention the study by Zavareh et al. (2018) with 256 bicyclists in Iranian population to determine variables which predict intention to use a helmet. The participants completed questionnaires on perceived probability of being involved in a road crash, the perceived severity of consequence that the participants would expect in a potential road accident, comparative optimism and bicyclists’ intention to use a helmet. The results showed that perceived susceptibility, perceived severity and perceived

benefits were statistically non-significant predictors of intention to wear a helmet. Being aware of risk does not always influence safety engagement (Kouabenan et al., 2015; Van der Pligt, 1996). On this premise, we can assume that perceived likelihood of risk, perceived severity of risk and perceived risk controllability is likely to influence safety behaviour. Understanding how healthcare workers perceive risk is imperative in establishing how they are committed or not to safety actions.

Conclusion

The various paradigms of risk perception combine to enrich our knowledge on the processes of risk analysis and how risk assessment influences behaviour of safety. Moreover, the different dimensions (likelihood, severity, controllability) on how people perceive risk improves the knowledge to justify why people take risk, or the reason they ignore preventive measures or at least highly underestimate the probability of negative outcomes or its severity. Therefore, the study of risk perception in accident prevention is imperative for understanding risky behaviour and how we can strengthen the efficacy of preventive actions. According to Kouabenan (2006c) technical and organizational policies deployed daily in accident management and prevention are not sufficient to define effective safety measures. In essence, subjective assessment of risk considering individuals characteristics which includes their personal representations, beliefs and the characteristics of the risk contribute greatly to giving a clear picture of the true nature of the risk individuals perceive in their environment. Certainly, personal attributes of risk perceivers and risk characteristics are very useful in risk analysis. They act as determinants of risk perception, and they define the sources of variations or biases in the perception of risk. This equally explains individuals' behaviors in risky situations.

Moreover, subjective analysis of risk does not only define the choice of behaviour by risk perceivers, but it is also an important subjective factor in decision making among experts, policy makers and organizational management. This could be explained in the model of expected utility. Citing a study on safety management among first line managers, Kouabenan et al. (2015) found that first line managers that got involved in safety management are those who perceive the risk facing employees at work. Therefore, understanding workers' perception about the risk they encounter is important in policy and decision making, according to Kouabenan (2006a & 2006b), this will improve employee's acceptance of the technical preventive measures designed by professionals on the account that they could recognize the link between what they perceive and the preventive measures. Identifying the variations in the way hospital workers in Nigeria perceive risk (in terms of perceived probability, perceived severity, perceived controllability) and their perceived effectiveness of the preventive actions can boost our understanding on why workers comply or not to certain preventive measures and how these measures can be improved. Moreover, beliefs which are part of people's subjective makeup could influence peoples risk perception and can define their behaviour of risk. In the subsequent chapter 4, we will explore the various literatures on beliefs and their role on safety behaviour. This next chapter will also review the link between beliefs and risk perceptions and naive causal explanations and how they interrelate with safety behavior.

Chapter 4: Beliefs as key factors in accident and risk analysis and prevention

Introduction

Taking beliefs into consideration is interestingly becoming broadly applied analytical approach for obtaining insight into health and safety issues, and for describing more effective and more enduring precautionary measures (Kouabenan, 2009; Ngueutsa & Kouabenan, 2017; Olejniczak-Serowiec & Rutkowska, 2018; Peltzer & Renner, 2003). Indeed, factors leading to unsafe work behaviour have been linked to different subjective elements like individuals' beliefs, risk perception and causal explanation of accidents (Arbis et al., 2016; Gandit et al., 2009; Ngueutsa & Kouabenan, 2017; Xia et al., 2017; Zavareh et al., 2018). Therefore, to determine how unsafe behavior contributes to accidents, it will be crucial to understand the underlying role of beliefs on safety behaviour of workers.

Kouabenan (1998) notes that among all other factors that influence people's attitude, beliefs are also found to be an important determinant of behaviour. Besides, beliefs existing either with the employers or employees, invariably have great influence on how individuals view various levels of safety in an organization, his acceptance of his willingness to avoid risks and stay safe (Kouabenan, 2003). Therefore, the aim of this chapter is to elucidate the relationships between beliefs and safety behaviour towards risks in the hospitals taking into considerations the perceptions of risks and causal explanations of accidents. In the subsequent subheadings, we will first define the concept of belief, followed by exploring the importance of the knowledge of belief in the analysis of risks and accidents and preventions. We will also discuss the models of belief and explain the various types of beliefs that are of interest to our studies. Finally, we will

explore the associations between these forms of beliefs and the perceptions of risks, causal explanations of accidents and safety behaviour.

1. Definition of the concept of belief

Many definitions have been given by different scholars to explain the general concept of belief (Halligan, 2006; Kouabenan, 2017; Ngueutsa, 2012; Pehkonen & Pietilä, 2003; Schwitzgebel, 2010) and to categorize the definitions by the characteristics of the form of belief being defined (Österholm, 2010). This means that defining belief can be based on the properties of the form of belief or based on the circumstances that gave rise to the belief. McLeod and McLeod (2002) are of the view that some definitions of beliefs are informal because they do not give in-depth explanations of the constructs being utilized in the definition. Nonetheless, in a broader definition “beliefs are scientifically unjustifiable statements, considered to be truth to which an individual adheres consciously, and which shape his/her actions and thoughts” (Ngueutsa & Kouabenan, 2017, p. 308). According to Kouabenan (2017) the notion of belief is “the way in which an individual perceives a situation or an event, very often in relation to the way in which he perceives his own capacities to cope with it” (p.14). In addition, Pehkonen and Pietilä (2003) in their own opinion defined “beliefs as an individual’s subjective knowledge and emotions concerning objects and their relationship, and they are usually based on his personal experience” (p. 2). Belief is also defined as the feeling of being certain that something true exists (Advanced learners dictionary and thesaurus, 2002). For instance, a person who believes that his life depends on God will express the conviction that his life situation can only be changed by a supreme being. This form of belief is referred to as belief in divine control. Besides, belief emerges when people have

a mental acceptance of some ideas and are completely certain that those ideas are true and real (Schwitzgebel, 2010). Nevertheless, at the center of all the definitions of belief is the certainty about something or an assumption that is held as true and yet they exist without verifications.

Fundamentally, beliefs are significant and cannot be ignored in the analysis of accidents and attitudes towards accident prevention because individuals held it as true. They also exist as a means through which people make meaning of their world and as a guide to their reactions (Halligan, 2006). Generally, beliefs are conceived as knowledge when the accepted proposition becomes evident to the individual who believes it to be true. Additionally, Schwitzgebel (2019) expressed the view that developing beliefs should be recognized as one of the elemental and essential attributes of the human mind. He further explained that belief plays an important role in both philosophy of mind and epistemology. In the next paragraph, we will give an in-depth explanation on the importance of the study of belief for understanding risky behaviour and attitudes towards prevention.

2. Relevance of the study of beliefs for understanding the intricacy of accident situations and preventive actions

Workplace circumstances concerning risks and accidents are very much complicated and it creates a situation of uncertainty. This situation makes it difficult for workplace accidents and risk analysis. As a result, Kouabenan (2007) noted that in a condition of uncertainty, individual representations and beliefs are alternative to circumvent for lack of explanation about the causes of the events which helps to provide a feasible understanding to the situations. He also explained that the lack of knowledge

to explain events ignites psychological distress in individuals' and for this reason, people resort to beliefs which allows them to keep balance and to develop a sense of control towards their environment. Also, people tend to ease their cognitive burden by depending on their belief as a way out to define a situation that demands explanations (Ngueutsa, 2012). These beliefs are perceived as a guide to behaviour either as an individual or as a group. Obviously, human behaviour is naturally complicated, and efforts are made towards the use of theories as functional guides for generalizing and predicting behaviour. The application of behavioral change theories to ascertain the factors that influence behaviour are necessary considering the complexity of such behaviour (Nazari et al., 2020).

Researchers have applied different health and safety models to explain the role of human behaviour on risk and accident analysis and prevention. Most of these models are centered on beliefs as a determinant for understanding the intricacy of human behaviour. Amongst these theories are the social cognitive theory of Bandura (1977) which has been applied in some studies as a behaviour modification theory (Naami et al., 2019; Nazari et al., 2020). The major component of social cognitive theory is self-efficacy which defines the perceived effectiveness of one's capabilities. This model suggests that the level of perceived self-efficacy determines an individual coping ability. Although social cognitive theory has been charged with some limitations owing to its assumption that change in the environment will automatically lead to change in behaviour, which may not be the case. Other theories largely applied in health and safety studies to predict behaviour are the theory of reasoned action by Ajzen and Fishbein, (1980) which was later translated to the theory of planned behaviour (TPB) by Ajzen (1985), and the health belief models of Becker & Rosenstock (1987). The application of these models in the study of behaviour

has shown that beliefs are determinant factors of behaviour (Kouabenan, 2007; Ngueutsa & Kouabenan, 2017). Kouabenan (1998) noted that “it would be erroneous to think that beliefs and practices, of which the limits concerning safety are known, are outmoded or that they only concern underdeveloped people” (p. 244). Furthermore, beliefs are expressed through behaviour and behaviour is a common or unifying causal factor in both developed and developing nations (WHO, 2013 cited by Ngueutsa & Kouabenan, 2017). Beliefs although naive yet guide peoples’ behaviour in different contexts, as road users, as employees, or as students and more because of its acceptance to explain events (Nguetsa & Kouabenan, 2017). Therefore, the interest in the study of beliefs takes priority over the fact that beliefs act as behavioral driving forces or the roots of human behaviour.

Notwithstanding, Kouabenan (1998) noted that professionals or laymen are biased in their judgment regarding risks and accident explanations which is caused by their belief systems, values, representations and shared experience. He also noted that strongly adhered beliefs may result in systematic error of judgments which forms resistance against any new information. These biases may affect risk perception at both individual and group level. Moreover, according to Kouabenan (1999) biased representations of risks and accidents leads to negligence about accident prevention and somewhat inefficacy of preventive measures. These indifferences and ineffectiveness of preventive actions result from individual variations in interpretation of the same situation and poor-quality communication about risks and accidents. Owing to this, it will be relevant to analyze the socio-cognitive functioning of different workers at the workplace which includes their beliefs and representations. This can improve accident analysis on how

people perceive risk and explain accidents and equally boost engagement in safety regulations.

In understanding the link between beliefs and actions, McIlroy et al. (2020) noted that perceived hopelessness or attribute of events to fate reflects an individuals' lack of control over accidents and it is likely to deter any action towards prevention. These forms of beliefs can cause workers to underrate risks at the workplace which is not healthy for work safety attitude (Ngueutsa & Kouabenan, 2017; Puchades et al., 2018). Besides, an elated confidence in one's ability to manage risks is perceived to be linked with positive safe behaviour (Riley & Baah-Odoom, 2012; Kouabenan & Ngueutsa, 2016). On the contrary, workers who have low perceived ability to engage in safety actions are likely to abandon such behaviour, exposing themselves to risk of accidents at the workplace. So, this could be explained by the fact that beliefs existing in its various forms can influence behaviour. We will first give a brief description of the various forms of belief that exist in the human mind which are of interest to our study.

3. Defining the different forms of beliefs

As earlier mentioned in the definitions of beliefs, apart from a general definition of belief as a construct, beliefs are also conceptualized and defined based on the form of belief or on the circumstance that gave rise to the belief as an individual or as a group. Österholm (2010) supported this view by stating that beliefs can be defined by some of the attributes of beliefs which can be directed on describing the characteristic properties of the supposed belief systems. This differentiates the variations on the various forms of beliefs that exist in the human mind. In this part, we will limit our definitions to three

forms of belief which are the focus in our studies. These include fatalistic beliefs, control beliefs and normative beliefs.

3.1. Fatalistic beliefs: According to Ngueutsa and Kouabenan (2017), fatalism is based on unavailability and predetermination of events which are mostly negative. Maercker et al. (2019) gave the definition as “the propensity of individuals or groups to believe that their destinies are ruled by an unseen power or are played out inevitably rather than by their will” (p .2). Moreover, in the opinion of Abraido-Lanza et al. (2007), fatalism is a general belief whereby predetermined course(s) are unchangeable and the activities of daily events that happen in one's life are beyond their control. In addition, Denette (1984 cited by Solomon, 2003) has it that “Fatalism is the idea that what happens (or has happened) in some sense has to (or had to) happen” (p. 435). Basically, fatalistic belief is commonly associated with the feelings of lack of control and helplessness over situations or rather, one’s fate. That is the belief that one’s fate is predetermined and is controlled by unseen forces.

3.2. Control beliefs: In the absence of the feeling of helplessness is control belief. The concept of control belief has been conceptualized with different terminologies. Bandura (1977) in his social cognitive theory used the term perceived self-efficacy. He defined it as having confidence in one’s ability to take actions when faced with demanding situations. According to Ajzen (1991), control belief results in perceived behavioral control. He stated that control belief portrays an individual’s belief to have the dispositions that may promote or preclude behavioral performance. He mentioned self-evidence as a motivator of an individual’s perception of his behavioral control. Precisely, perceived behavioral control or perceived self-efficacy is the feeling of one’s ability to handle events. This indicates a perceived confidence in one's capacity to overcome in the

event of an unseen circumstance. Lang (2015) asserts that control beliefs are marked by a person's expectation that an individual's actions or thoughts are responsible for outcomes or future events. This implies that the results of any activity should be a consequence of one's action or their state of mind. Again, Wallston (2001) views control belief as an individuals' ability to manipulate a present occurrence or a future event. He also mentioned that in the health domain, control beliefs are one's cognitions about the ability to handle (regulate) health behaviour, their health consequence or health care.

3.3. Normative beliefs: Normative beliefs are people's belief about the extent to which important others in their life anticipate they should or should not engage in a particular behaviour (Ajzen, 1991). To determine an individual's normative belief, one's motivation to apply should also be measured to know how much a person desires to act in line with the expectations of the important others. Measuring the expectation of referent or important others and the motivation to comply with the important others predicts individuals' subjective norms. According to Ajzen (1991) subjective norms are the perceived social pressure to carry out or not carry out a given behaviour. The referent others determine the situation at which the behaviour is expected. These could be ones' mother, father, husband, wife, the boss at work, colleagues, members of a group etc. In essence, individuals perceived subjective norms and motivation to conform to the expectations of important referent others, results in their normative belief. In this regard, we can assume that behaviour of Nigerian healthcare workers could be influenced by beliefs and personal representations which could also interfere in their risk perception and causal explanations of accidents. These factors will be discussed one after the other in the following subheadings.

4. Effects of Fatalistic beliefs on risk perception, and safety behaviour

In this present age marked by increasing rationalism, there is a higher possibility to consider fatalistic beliefs as an ancient ideology or a phenomenon from under-developed countries (Kouabenan, 2009). Notwithstanding, some scientists mentioned that the practice of attributing incidents to invisible causes is found in various manner both in the African traditional societies and in the modern western culture (Morris & Peng, 1994; Kouabenan, 1998). Also, constant exposure to bad incidences and social discomfort can strengthen fatalistic belief (Kouabenan, 2009). It is known that fatalists make causal attributions that portray their inaptitude over risks (Kouabenan, 1999). This form of belief can lead to use of magical powers to uncover the causes or persons that are believed to be the architect of an event. Therefore, these forms of actions embedded upon beliefs, can negatively influence safety-conscious behaviour in organizations.

Fatalistic belief is often time indicated to have a negative relationship with safety behavior (McIlroy, et al., 2020; Ngueutsa & Kouabenan, 2017; Patwary et al., 2012; Simsekoglu, 2013). In essence, an individual's feelings of helplessness and the inevitability of events (Maercker et al., 2019) marked by the acceptance that fate is predetermined (Abraído-Lanza et al., 2007) in one way or the other jeopardizes one's ability to maintain safety behaviour. Fatalism has been in existence in the human mind, and it forms their ideology which influences their decision and action. In the event of complicated situations, explanation becomes imminent, and fatalism comes to play as a source for understanding issues that are difficult to explain (Kouabenan, 2007) or things that are beyond technical explanations. Based on this, people mostly rely on beliefs to define whatever is happening around them especially when there is a lack of information to support the situation. Moreover, understanding the causes of accidents has been of

interest and many factors such as fatalistic beliefs are being explored to understand accident situations. From various studies on fatalistic beliefs, it has been found that fatalism has a role to play on individuals' risk perception, causal explanation of accident and safety behaviour. In the following sub-paragraphs, we will review the link between fatalistic beliefs, safety behaviour, risk perception and causal explanation of accidents.

4.1. Fatalistic beliefs and safety behaviour

A major characteristic of a fatalist is the feeling of helplessness and unavailability of events. A person who possesses the thought that accidents at work are inevitable may have the assumption that it is less important to protect oneself (Ngueutsa & Kouabenan, 2017). Studies have shown that fatalistic beliefs negatively affect safety behaviour which indicates that individuals' who are fatalists will engage in less safe behaviour towards work risks and accidents. Ngueutsa and Kouabenan (2017) found that fatalistic participants were likely to engage in more unsafe behaviour than non-fatalists. The assumption by Ugwu et al. (2015) that workers' fatalistic belief about accident risk will significantly predict unsafe work behaviours among hospital nurses was confirmed in their analysis. Furthermore, a study by Patwary et al. (2012) among medical waste workers in Bangladesh, found that majority of the workers (73%) did not wear personal protective equipment and the behaviour was associated with their fatalistic beliefs. Additionally, the results of the study by Peltzer (2003) shows that both black and white South African motor vehicle drivers who were identified as non-fatalistic drivers were observed to use seatbelt, they also gave self-reported seatbelt use. These findings support the view that fatalism is a determinant of non-compliance with safety work behaviours.

4.2. Fatalistic beliefs, risk perception and safety behaviour

Studies have demonstrated that fatalistic belief is a determinant of the variations in risk perception. For example, a study by Ngueutsa and Kouabenan (2017) shows that fatalism can influence individuals' risk perception and safety behaviour. Their study involved 525 road users who responded to a questionnaire on fatalistic belief, risk perception scale on road accidents and a scale on safety behaviour. The aim of their study was to know how fatalism affects risk perception, how risk perception mediates the effect of fatalism on safety behaviour. More so, the correlational and regression analysis results of the studies by Ngueutsa and Kouabenan (2017) shows that fatalistic beliefs have a negative significant influence on risk perception and on reported safe behaviour. This means that drivers with high fatalistic beliefs have low risk perception of road traffic hazards and reported less safety behaviour. Moreover, risk perception was positively related to safety behaviour which explains that the higher the perceived risk, the higher the safety behaviour. Having a driving license or not does not have any difference on the level of risk perception and reported safety behaviour of individuals. Furthermore, the results of the study by Ngueutsa and Kouabenan (2017) reported that risk perception mediated the effect of fatalistic belief on safety behaviour. The mediation outcome shows that higher fatalism is associated with low-risk perception and high safety behaviour.

In the same line of enquiry, Simsekoglu et al. (2013) explored traffic and non-traffic risk perception, fatalism and driver behaviors in Turkey and Iran. The authors found that Iranian participants' high fatalistic beliefs negatively correlated with their risk perception and safety behaviour unlike the Turkish participants who scored low in fatalistic beliefs. This implies that high fatalistic beliefs are linked with low-risk perception and low engagements in safety rules like use of seat belts. In comparing gender

on risk perception, they found that women perceive more risk than men and high-risk perception is assumed to be related to low fatalism and higher engagement in safety actions. Additionally, it is believed that individual make-up such as the socio-demographics have a link with fatalistic beliefs. This will be discussed in the next sub-heading.

4.3. Fatalistic beliefs, accident experience and safety behaviour

Some authors like Kouabenan (1998); Peltzer et al. (2003) have established that accident experience has a significant relationship with fatalistic belief and risk-taking behaviour. A direct effect of accident experience and safety behaviour was found in the work of Kouabenan (1998) which indicates that accident experience of more than two times is positively related to precautionary actions. He found that people who have experienced accidents are less involved in risky behaviour than those who have not experienced accidents. Also, Peltzer et al. (2003) found that both individuals who are witness to accidents and those who have experienced accidents were associated with low-risk behaviour. Therefore, being a witness of accidents has a positive influence on behaviour towards safety. In addition, Patwary et al. (2012) found a positive correlation between work accident experience and fatalistic belief. Most of their participants' responses were persistent with fatalistic beliefs and their comments indicated a high prevalence of accidents (95%) among the workers (mostly needle prick injury). Observations show that these workers do not follow safety protocol. For instance, most of the workers were observed not using gloves and they were also observed using inappropriate receptacles and plastic bags without biohazard signs. The observation during the study also indicated that the managers' action contributes to the accidents of

the workers because there was no provision of personal protective equipment (PPE). Also, the managers gave comments related to fatalistic belief, believing that the accident the workers experience is their fate, and it is not different from what happens in other places. This fatalistic statement from the managers justifies their lack of commitment to their responsibility of ensuring the safety of workers. Generally, the findings of Patwary et al. (2012) suggest that workers who have experienced accidents have fatalistic beliefs. Also, accidents experienced by the workers are also a consequence of the action of the managers which indicates an external causal explanation of accidents. Likewise, Peltzer and Renner (2003) found that fatalistic belief was positively related to accident experience and accident witness. Moreover, fatalistic beliefs are also linked to gender, and this is explained in the next paragraph.

4.4. Fatalistic beliefs, gender and safety behaviour

In terms of gender and fatalism, Peltzer (2003) carried out a study on a sample of South-African black and white drivers on their use of seat belts and fatalism. He found that men are higher on fatalistic attitudes than women. In addition, women reported the use of seatbelt frequently more than men. In the next paragraph, we will review the role of control beliefs on risk perception, causal explanation of accident and safety behaviour.

5. Understanding the link between control beliefs, risk perception and safety behaviour

Many studies have found a link between control belief and risk perception and its relation to safety behaviour (Kouabenan, 2014; Kouabenan & Ngueutsa, 2016; Lang 2015; Mbaye & Kouabenan, 2013; Motalebi et al., 2014). In the following sub-headings,

we will discuss the relation between control beliefs and safety behaviour; control beliefs and risk perception followed by the role of control beliefs on causal explanations of accidents and the overall effect of these links on safety behaviour.

5.1. Control beliefs and safety behaviour

Among many other factors that influence behaviour, control beliefs have been found to have a great effect on safety-related behaviors (Kouabenan & Ngueutsa, 2016). A study was carried out by Kouabenan and Ngueutsa (2016) to explore the role of control beliefs on engagement in hygienic and safety behaviour focusing on the condition of foodborne illnesses. They engaged 217 workers in a fast-food restaurant who answered a questionnaire on control beliefs (normal periods; rush periods), fatalistic beliefs, risk perception, and engagement in hygienic and safety behaviors. Two aspects of control belief were adopted in the study which is perceived self-efficacy (Bandura 1977 cited by Kouabenan & Ngueutsa, 2016) and perceived effectiveness of the preventive actions. The former depicts an individual's perceived ability to engage in safety behaviour while the latter is the form of control belief marked by an individual's perceived effectiveness of the actions that are employed concerning accident situations. The results of their study confirm their hypothesis that control beliefs influence risk perceptions and risk-related behaviour. They established that an individual's perceived ability to implement hygienic and safety regulations during normal periods was a positive significant determinant of engagement in hygienic and safety behaviours. The result also shows perceived ability to carry out the preventive measures during rush periods is a significant predictor of safety behaviour. In this case, perceived capability to employ hygienic measures and safety

regulations strongly predicted involvement in hygienic and safety behaviour irrespective of the work situation.

Furthermore, the study of Vekiri (2010) showed that elementary school students who had higher perceived competence demonstrated a positive attitude on Information Communication Technology (ICT) use while students with low self-efficacy belief had lower confidence in their ICT skills. This shows that high self-efficacy has a positive significant relationship with a positive attitude. More so, an intervention study by Milton and Mullan (2012) showed that perceived behavioral control is the best method for improving food safety behavior. This is as a result that perceived behavioral control was significantly correlated with intention and observed safety behavior. These findings show that perceived behavioral control has a significant positive influence on safety behavior.

Conversely, Ngueutsa (2012) found that the participants with high perceived ability to cope with dangerous traffic situations (CPFSD) displays unsafe behaviours than those with low CPFSD. In other words, the behaviours are more insecure when the CPFSD is high. In essence, high control belief favours unsafe behaviours. Having buttressed the role of control beliefs on safety behaviour, in the following sub-heading we will review the relationship between control beliefs, causal explanation and safety behaviour.

5.2. Control beliefs, risk perception and safety behaviour

Findings have demonstrated that perceived behavioural control is a relevant factor that influences an individual's level of adaptation to situations which reflects on the behavioural outcome (Deery, 1999; Gandi, et al., 2009). A direct association between perceived capabilities and perceived risk shows that overconfidence in one's skills lowers

risk perception (Chaurand & Delhomme, 2013). Nevertheless, the relationship between control belief and safety behaviour can be influenced by risk perception (Morisset, et al., 2010; Puchades et al., 2018). This suggests that people who have high perception of risk and high perceived behavioural control are likely to engage more in safety actions compared to people with high-risk perception and low self-efficacy. Nevertheless, some studies suggest that perceived self-capability can moderate the effect of risk perception on safety behaviour (Kouabenan & Ngueutsa, 2016; Puchades et al., 2018; Rimal & Real, 2003).

A study on cycling behaviour indicated that risk perception has a direct positive effect on avoidance in engaging in mixed traffic situations which is a risky state of cycling and mixing with other motor vehicles on the road (Chataway et al., 2014). This simply explains that the higher the perceived risk in cycling with motor vehicles, the lesser the involvement in these traffic mixed conditions which portrays some degrees of avoidance behaviour. The reverse was the case with the results of the study by Puchades et al. (2018). They sought to explore the role of perceived competence and risk perception of cyclists' involvement in risky situations and safety outcomes in cycling. Their study involved 298 Italian cyclists who answered questionnaires measuring their perceived competence, their risk perception and their experience of near misses. Firstly, they showed that perceived control (self-efficacy) has no direct effect on behaviour of avoiding mixed traffic. They also found that risk perception has no direct effect on avoiding cycling in mixed traffic situations which simply means that risk perception did not predict the avoidance behaviour. However, there was a significant interaction of perceived control on the relationship between risk perception of involvement with motor traffic and avoidance of

mixed traffic. This justifies the assumption that control belief will mediate the effect of risk perception on involvement in preventive actions.

In addition, the effect of a positive interaction between control belief, risk perception and safety behavior were established in the study by Kouabenan and Ngueutsa (2016). They found that perceived ability to employ safety regulations is positively related with greater perceived risk of contamination. Moreover, the result of Kouabenan and Ngueutsa (2016) showed a significant interaction between perceived capability and perceived risk perception, which implies that individuals with high control belief (perceived ability) practiced hygienic and safety measures when they perceived risk of food contamination as highly hazardous. On the contrary, when perceived control to apply the safety measures was low, engagement in hygienic and safety behaviours is less irrespective of the individuals' level of perceived risk. Therefore, this simply means that the effect of perceived behavioral control is moderated by risk perception of food poisoning. In previous paragraphs, we discussed the link between fatalistic beliefs and control beliefs on causal explanation, risk perception and safety behaviour. In the next subheading, we will discuss the link between normative beliefs, causal explanation of accident, risk perception and safety behaviour.

6. Normative beliefs in safety studies

Normative belief is a construct of the theory of planned behavior by Ajzen (1991) which has been employed as a functional theory for understanding behaviours. Normative beliefs are also referred to as subjective norms or injunctive beliefs (Lin & Roberts, 2020; Göckeritz et al., 2009) which define what a person thinks others approve or disapprove of. Besides, vital knowledge on beliefs that differentiates individuals who perform a

specific behaviour from others who do not adopt the behaviour, can be understood through theoretical analysis of beliefs related to the adoption of the behaviour being carried out (Fishbein & Stasson, 1990). In essence, normative beliefs are important in predicting individuals' safety behavioural intentions that determine the actual behaviour. For instance, studies have shown that normative beliefs are key elements capable of influencing safety behaviours such as safe food handling behaviour (Lin & Roberts, 2020; Milton & Mullan, 2012; Mullan & Wong, 2009), breast self-examination (Mason & White, 2008), engagement in physical activity (Motalebi et al., 2014) risky driving behaviour (Olejniczak-Serowiec & Rutkowska, 2018; Parker, 2002) etc. Also, studies have shown that normative beliefs have a correlation with risk perception, causal explanations and safety behaviours (Page et al., 2012). In the subsequent subheadings, we will discuss various studies that have applied normative beliefs in explaining behaviours and the link between this form of beliefs and other cognitive constructs that includes risk perception and causal explanations.

6.1. Normative beliefs and safety behaviour

Basically, positive behaviour can be improved by examining the underlying subjective norms that are linked with such behavioral performance (Mason & White, 2008). Some authors have tried to establish the link between the beliefs in the expectations of referent others and safety behaviour or any target behaviour. For instance, Milton and Mullan (2012) found that subjective norm and attitude were significantly correlated. Also, their study shows that normative belief significantly predicted 26% of the participants' intention to prepare food hygienically. They also confirmed that their result was in line with the outcome (19%) of the study by Clayton and Griffith (2008) on hand hygiene

practices in catering outlets. Clayton and Griffith (2008) found that normative belief significantly predicted caterers' intention to engage in hand hygiene practices.

In addition, Javadi et al. (2013) study on nurse patient safety behaviour showed that normative belief had a strong influence on the nurses' intention to carry out patient safety behaviours. Javadi et al. (2013) engaged 124 nurses who responded to a questionnaire on TPB construct. The results of their study indicate that nurses who have normative beliefs engage in patient safety behaviour. When compared based on the type of hospital, nurses in both public and private hospitals' who have high normative belief are all involved in nurses' safety behaviour. Also, Ledesma et al. (2018) found that participants who scored high in subjective norms (normative beliefs) engage in the use of seat belts. With these findings, Ledesma et al. (2018) proposed that the TPB model and implicit attitudes are important constructs needed to improve the explanatory power of the models used to predict road safety behaviour. This, they suggest, will improve safety programs and accident prevention. Nevertheless, there are variations in the findings on normative beliefs and target behaviours.

This inconsistency in the outcome of the effect of normative belief on behaviour can be seen from the work of Lin and Roberts (2020). They found that managers' or co-workers' expectations have no influence on the behaviour of workers in the foodservice establishments; rather they were influenced by their own personal beliefs and ethics. They stated that the “finding challenges the current directional relationships within the TPB, providing evidence that the antecedents of forming food safety norms should be for either moral reasons or personal personalities first, then comply with good motivations” (Lin & Roberts, 2020 p. 5). In addition, Mason and White (2008) carried out a study on TPB and breast self-examination (BSE) with Australian women less than 50 years of age. They

administered questionnaires developed by the authors which were built in line with the process applied by Ajzen & Fishbein, (1980). The items that represent the salient normative beliefs were based on the four most frequently reported referents or referent groups (e.g., doctor/health practitioner, spouse or partner). On the contrary, Mason and White (2008) multivariate analysis did not show any significant relationship with normative belief and target behaviour of BSE. There was no significant difference between performers of BSE and non-performers on normative beliefs. Having explored the findings on the link between normative beliefs, perception of preventive actions and behaviour, in the next paragraph, we will review the link between normative belief, risk perception and safety behaviour. We will further look at how risk perception mediates the effects of normative beliefs on safety behaviour.

6.2. Normative beliefs, risk perception and safety behaviour

Not too many studies have been carried out on the relationship between perceived social norms, risk perception and safety behaviour. As part of the TPB model, normative beliefs are psychosocial factors that can be presumed to predict risk perception and safety behaviour (Lewis & Thombs, 2005; Page et al., 2012). A study was carried out by Lewis and Thombs (2005) on the role of risk perception and normative beliefs on students' alcohol involvement. They proposed that normative belief will be positively associated with alcohol drinking and high-risk perception will be linked with reduced level of involvement in alcohol use. They found that normative beliefs of close friends' alcohol use are significant with alcohol involvement whereas risk perception of the consequences of alcohol drinking behaviour has no significant influence on the students' alcohol involvement. The controlling effect of normative belief on the influence of risk perception

on safety behaviour is yet to be established. Also, Page et al. (2012) found that normative beliefs of the perceived popularity of smoking among successful businessmen or high-class people, significantly correlated with a higher perceived risk of susceptibility to smoking and actual smoking behaviour. They also revealed that perceived prevalence has no association with smoking behaviour. Page et al. (2012) presumed that the weak association between perceived prevalence and smoking behaviour may be as a result of the possible indirect influence of normative belief which can have a consequence on behaviour. This means that perceived prevalence or susceptibility can mediate the influence of normative belief on smoking behaviour.

Conclusion

The studies reviewed in this chapter have revealed that beliefs are important psychosocial factors that explain human behaviour. Ledesma et al. (2018) mentioned that enhancing safety programs and accident prevention requires consideration of beliefs and implicit attitudes in accident and risk analysis. This will boost the explanatory efficacy of belief models for predicting safety attitudes. For instance, health risk studies (Kouabenan, 1990a; Patwary et al., 2012) show that applying hygienic measures could be perceived as important to some while others may not. People perceive the same situation and can act differently based on their differences in their personal interpretations about the same situation. These variations in perception and actions are explained by individual beliefs and cons regarding risks. Kouabenan (2009) stated that individual perception based on their beliefs and their personal representations about risk and risk target influences behaviour at various levels. He mentioned that these factors are determinants of a persons' ability to take risk, their need for safety and risk prevention. In addition, beliefs that

concerns the target of a risk, their demand for safety, their value including the perceived benefit of taking risks, should all be put into consideration when evaluating the reasons for safety-related behaviours.

Notably, safety behaviour can be influenced by some cognitive factors and the 3 forms of beliefs as mentioned in the review which includes: 1) beliefs of unavailability and predetermination of events which are mostly negative and are marked by the feeling of helplessness, 2) the belief in the expectations of recognized important others who lead social pressure to perform or not perform certain behaviours and 3) the belief in one's perceived behavioral control to carry out some actions. Besides, beliefs can impact on individuals' risk perception and causal explanations. Certainly, studies on beliefs and safety behaviour have shown that risk perception and causal explanation are two important cognitive constructs through which individual beliefs are expressed. These interactions are a possible source of bias on individuals' beliefs and mostly induce negative behaviour. Krunglanski and Ajzen (1983 cited by Kouabenan, 2009) also stated that "deep-rootedness and persistence of certain beliefs can lead to systematic errors that may cause any new contradictory information to be overshadowed" (p. 771) because beliefs are passed from one generation to another which people hold to be true. Moreover, these biases influence risk perception and causal explanations of both at individual and group levels. Beliefs could cause risk to be overemphasized or de-emphasized. For instance, fatalistic beliefs instigate the feeling of helplessness and can cause people to be involved in unsafe behaviours. These situations can be found in the operations of Nigerian healthcare workers since organizational risks are known for their complexity and uncertainty. Therefore, it is important to assess healthcare workers beliefs to understand their risk perception and causal explanation of accidents. In this regard, we will anticipate

studying the roles of beliefs on risk perception and causal explanations and safety behaviour of healthcare workers at the workplace. In chapters 2-4 we explored the various concepts that influence safety behaviour in risk analysis and prevention, in the next chapter 5, we will state the general problem and the general hypotheses of the study.

Chapter 5: Understanding accident situation and safety behaviors of healthcare workers in Nigerian hospitals: general problems and hypotheses

1. General Problem of the thesis

The activities of healthcare workers are aimed at saving lives and restoring failing health. Nevertheless, these workplace activities expose HCWs to different forms of risks like biological risks (e.g., contracting infections and diseases), physical risks (e.g., falling victim of assault or fall), chemical risk etc. As a result of this high-risk work situation, organizational health and safety regulatory bodies (E.g., the International Labor Organization (ILO); World Health Organization (WHO), are put in place to take responsibilities which are believed to moderate work-related hazards and organizational risks. Indeed, workplace accidents are yet a subject of concern as annual reports on work incidences are still on the increase (Alli, 2008). The various available data on risk and accidents among healthcare workers (Isara et al., 2015; Ogoina et al., 2014) demonstrates that healthcare workers are confronted daily with several forms of physical and health risks. For example, we found in the study by Weddle (1996) on hospital service workers that all the participants have experienced work injury. These health threats pose challenges to life and wellbeing of HCWs, capable of limiting the proposed achievement of the organization and causing a drastic economic loss (McLain & Jarrell, 2007; Nahrgang et al., 2011). In Nigeria, Isara and Ofili (2012) pointed out that Nigerian HCWs are in constant jeopardy of occupational health injuries and diseases because of the nature of their job. They are frequently exposed to risky practices (e.g., use of needles and sharp objects) and direct contact with patients with different kinds of ailment and other challenges of events that may arise in the course of duty. In addition, Amosun et al. (2011)

affirmed that healthcare workers' carelessness, negligence and poor knowledge of the operational skills of modern healthcare facilities are being witnessed in Nigerian hospitals. These assertions aroused our curiosity to note that various factors could be responsible for HCWs accidents. Therefore, to further understand the accident situation in Nigerian hospitals, this thesis is set to expound our knowledge on the factors that encourage accidents in the health sector, for the purpose of contributing more enduring preventive measures.

Basically, the effectiveness of accident preventive measures in the health sector is questionable. Ngwama (2016) believes that these measures might have been sabotaged by governments' complacency in handling defaulting workers and monitoring employees' activities. For Amosun et al. (2011), healthcare workers' indifferent activities could be responsible for accident situations in hospitals. For instance, Markovic-Denic, et al. (2015) noted that HCWs show non-compliance to safety regulations and a remarkable refusal to report accidents for medical assistance. In addition to these justifications, Kouabenan (2014) noted that accidents at work may be because of poor risk communication between workers and employer(s). In essence, one cannot solely rely on safety regulations and policies to explain incidences and safety behaviour of workers. Therefore, for a process of developing an improved preventive measure, it will be imperative not to consider only technical factors but also factors relating to HCWs themselves, their beliefs, naive causal explanation, risk perception, perception of preventive actions and how these factors could encourage or deter safety practices.

Kouabenan (2009) proves the assumption that beliefs and biased representations of risks and accidents can play a role in accident analysis and prevention. These beliefs and personal representations are perceived to influence individual behaviour.

Moreover, Kouabenan (2014) noted that an individual's causal explanation of accidents should be recognized in structuring the measures for accident prevention. This is explained by the fact that spontaneous explanations given by individuals affect their responses towards safety (Kouabenan, 2013). Primarily, naive causal explanations can help unravel vital information on risks and accidents at work and the related behavior of workers towards these risks. To achieve this, it will be imperative to assess workers' risk perception and naive explanation of accidents, as they can influence individual decisions and preventive actions (Kouabenan, 1999; 2009). Additionally, it is noted that people's formation of attitude and actions are mostly driven by their causal beliefs (Kouabenan, 1999, 2005). For example, fatalistic beliefs have been associated with reckless attitudes. This could be explained by the fact that individuals' who believe accidents to be predetermined, pay less attention to safety because they think that things that happen to people are dependent on the person's fate. Bearing these in mind, it can also be presumed that studying beliefs, risk perception and naive causal explanations of health workers in Nigerian hospitals will facilitate our understanding of HCWs perceived effectiveness of preventive actions and their safety behavior at the workplace . As a result of these assumptions, we have four lines of investigation to help us explore the relationship between the variables of our study and the behaviors of healthcare workers in Nigeria.

Firstly, we will establish the effects of beliefs on HCWs perceived effectiveness of preventive actions and their behavior at work. For the study on beliefs, we are interested in normative beliefs which can also be referred to as subjective norms. Additionally, control beliefs which explains the level of control an individual asserts over a given situation would be examined to establish its relationship with safety behaviour. Finally, on the forms of beliefs, we have the fatalistic beliefs, which reflects an individual

feeling of helplessness towards risks and accident situations. Secondly, we will examine the effects of naive causal explanations of accident on HCWs perceived effectiveness of preventive actions and safety behavior.

The third study will focus on the relationship between risk perception, perceived effectiveness of preventive actions and safety behavior. Lastly, the fourth study will be on the direct and mediation relationship between beliefs, naive explanation of accident, risk perception and safety behavior of hospital workers. Moreover, in all the categories of our studies, healthcare workers socio-demographic variables will be considered important in relation to their safety behavior and as moderating variables.

2. General Hypothesis of the study

In our first empirical study, we are interested to know the effect of beliefs on perceived effectiveness of preventive actions and safety behaviour of healthcare workers. Studies show that fatalistic beliefs (Ngueutsa & Kouabenan, 2017; Ugwu et al., 2015), control beliefs (Kouabenan & Ngueutsa, 2016; Taylor et al., 2012) and normative beliefs (Milton & Mullan, 2012; Lin & Roberts, 2020) can influence safety behaviour. Practically, Fatalism could manifest in a high-risk situation whereby people may tend to believe that they are helpless in the face of risk and that these risks are inevitable. This form of belief according to Ugwu et al. (2015) and Ngueutsa and Kouabenan (2017), leads people to engage in unsafe actions. Owing to this, we can presume that HCWs who possess the thought of helplessness and fate as a cause of accident are likely to ignore safety actions. Likewise, we would presume that fatalistic beliefs will have a negative effect on perceived effectiveness of preventive actions. Contrary to fatalistic beliefs is control beliefs. According to Ulleberg (2002), high control beliefs lead one to engage in

unsafe behaviour. In this regard, we can assume that overestimated capacity among healthcare workers can lead to inappropriate behaviour at the workplace than among those with low control beliefs. Again, we propose that control beliefs will positively relate with perceived effectiveness of preventive actions. Moreover, Normative beliefs according to Lin and Roberts (2020) and Milton and Mullan (2012) encourage adoption of safety behaviour. Drawing from the findings of these authors, we can hypothesize that normative beliefs lead people to adopt safety behaviour and perceive preventive actions as effective.

In our second study, we focus our attention to understand the link between causal explanations of accidents on perceived effectiveness of preventive actions and safety behavior of HCWs. Kouabenan (2013) found that the more workers attributes accidents to fate or uncontrollable external factors the more they are likely to engage in unsafe behaviour. Also, Goncalves et al. (2008) demonstrates that external explanations of accident negatively affect an individual behaviour towards risk. On the other hand, Boua (2021) and Ngueutsa (2012) found that attributing accidents to internal causal factors, can lead people to engage in safety behaviour. Based on these findings, we will propose that HCWs who give internal explanation will engage safety behaviour and perceive preventive actions as effective. Also, we will presume that external causal explanation will lead to unsafe behaviour and low perceived effectiveness of preventive actions. Following the model of naive explanation of accident by Kouabenan (1999), we assume that naive causal explanation of accident will be moderated by socio-demographic variables. Shaw and McMartin (1977) and Taylor and Kleinke (1992) observed that women explain accidents more by internal factors than men. Moreover, Niza et al. (2008) and Stewart (2005) show that accident victims attribute more causes to external uncontrollable factors than those with no accident experience. On this premise, Gonçalves

et al. (2008) found that accident experience leads people to explain accident by external causal factors and to adopt unsafe behavior. Following these findings, we will hypothesize that the effect of causal explanation on safety behaviour will be moderated by age and accident experience.

Our third empirical study centers on the relationship between risk perception, perceived effectiveness of preventive actions and safety behaviour of HCWs at the workplace. We aim to establish whether HCWs perceived susceptibility, perceived severity and perceived controllability influences their perceived effectiveness of preventive actions and safety behaviour. Brewer et al. (2007) and McCool et al. (2009) established that low perception of risk is associated with less adoption of safe behaviour towards risks. While higher perception of risk is linked with higher involvement in preventive measures (Kouabenan et al., 2015; Şimşekoğlu et al., 2013). Hence, we expect that HCWs who underestimate hospital risks are likely to exhibit unsafe behaviors at the workplace than those who have higher risk perception. More so, those who have high perceived risk probability and perceived risk severity will perceive low the effectiveness of preventive actions than those who have high perceived risk controllability. Additionally, Vaughan (1993) found that a high perception of the effectiveness of the recommended precaution actions are linked with engagement in safety behaviour. Furthermore, risk perceptions can differ based on individual variables like age, gender, accident experience and professional experience. According to Kouabenan et al. (2003), accident experience can lead to increased perceived vulnerability of risk. In essence, the perception of risk vulnerability among healthcare workers can vary based on their involvement in accidents. Gletty (2017) found that being an accident victim is associated with higher perceived probability and perceived controllability of risk. While some

studies find a positive link between accident experience and risk perception, some others found a negative link (Lindell & Perry, 1990; Ngueutsa & Kouabenan, 2017). Some other studies did not record any link between risk perception and accident experience (Kouabenan, 2002). Therefore, we will presume that the relationship between risk perception and safety behaviour will be moderated by age and accident experience.

The fourth quantitative analysis is on the relationship between fatalistic beliefs, control beliefs, normative beliefs, risk perception, naive causal explanations of accidents and safety behaviors. The objective is to investigate the role of beliefs on risk perception and naive causal explanations of accidents. We also aim to examine if risk perception and naive explanations mediates the relationship between beliefs and safety behaviors. According to Şimşekoğlu et al. (2013), individuals who portray high fatalistic beliefs tend to underestimate risk and engage in unsafe behaviour. Additionally, Kouabenan (1998) and Patwary et al. (2012) found that individuals who are high in fatalistic beliefs, explains accident by external factors. According to these results, we suppose that fatalistic beliefs will be negatively related to low-risk perception. Also, we hypothesize that fatalistic beliefs will be positively related to external causal explanations. Finally, owing to the fact that fatalistic beliefs predict external explanations, we will presume that the relationship between fatalistic beliefs and safety behavior will be mediated by risk perception and external causal explanations.

Additionally, Chaurand and Delhomme (2013) observes that elated confidence over a dangerous situation leads one to underestimate such risk. This is also the case with Causse et al. (2005) that a high perceived behavioural control is associated with lower perceived vulnerability to risk. We therefore propose that HCWs who have strong control beliefs will underestimate the risk associated with their work. Moreover, the effect of

control beliefs on behaviour can be influenced by naive explanations of accidents. This was expressed by Bandura (1977) showing that having a sense of control can lead individuals to explain accidents by internal factors which encourages adoption of safety behaviour. In addition, Lefcourt and Davidson (1991) show that people who consider themselves to be more efficient than others attribute accidents to personal factors. Hence, we can assume that perceived higher competence of handling hospital activities among healthcare workers can lead them to explain accidents by internal factors. Finally, as control beliefs predict internal explanations, we will hypothesize that the relationship between control beliefs and safety behaviour will be mediated by risk perception and internal causal explanations.

Furthermore, a strong belief in the behavioural expectations of referent persons can lead one to overestimate risk. This was established in the work of Page et al. (2012). He found that people who have higher normative beliefs overestimate their perceived risk of vulnerability and are likely to engage in safety behaviour (Lewis & Thombs 2005). Therefore, we expect that HCWs who have a strong belief in the behavioural expectations of important people in their lives will have a higher perceived risk of susceptibility to such risk. In addition, there is lack of studies on the relationship between normative beliefs and causal explanations. Dubois (1988) observed that low normative pressure among school children, leads to low attribution of personal responsibilities. Accordingly, we hypothesize that normative beliefs will positively predict internal causal explanation. Moreover, we will presume that the effect of normative beliefs on safety behaviour will be mediated by internal causal explanation and risk perception.

The general model of the hypotheses for the studies is outlined in figure (7), page 117. This model shows that beliefs, naive causal explanation and risk perception are

factors that predict perceived effectiveness of preventive actions and safety behaviour. Furthermore, perceived effectiveness of preventive actions will predict safety behaviour. Also, the latent variables (beliefs, causal explanations and risk perception) interchangeably correlate with each other and can predict safety behaviour. Considering the socio-demographics, they are important in the study because they can moderate the effect of the beliefs, causal explanations and risk perception on safety behaviour. In addition, there will be mediation analysis to see how the latent variables affect safety behaviour when the socio-demographics are controlled.

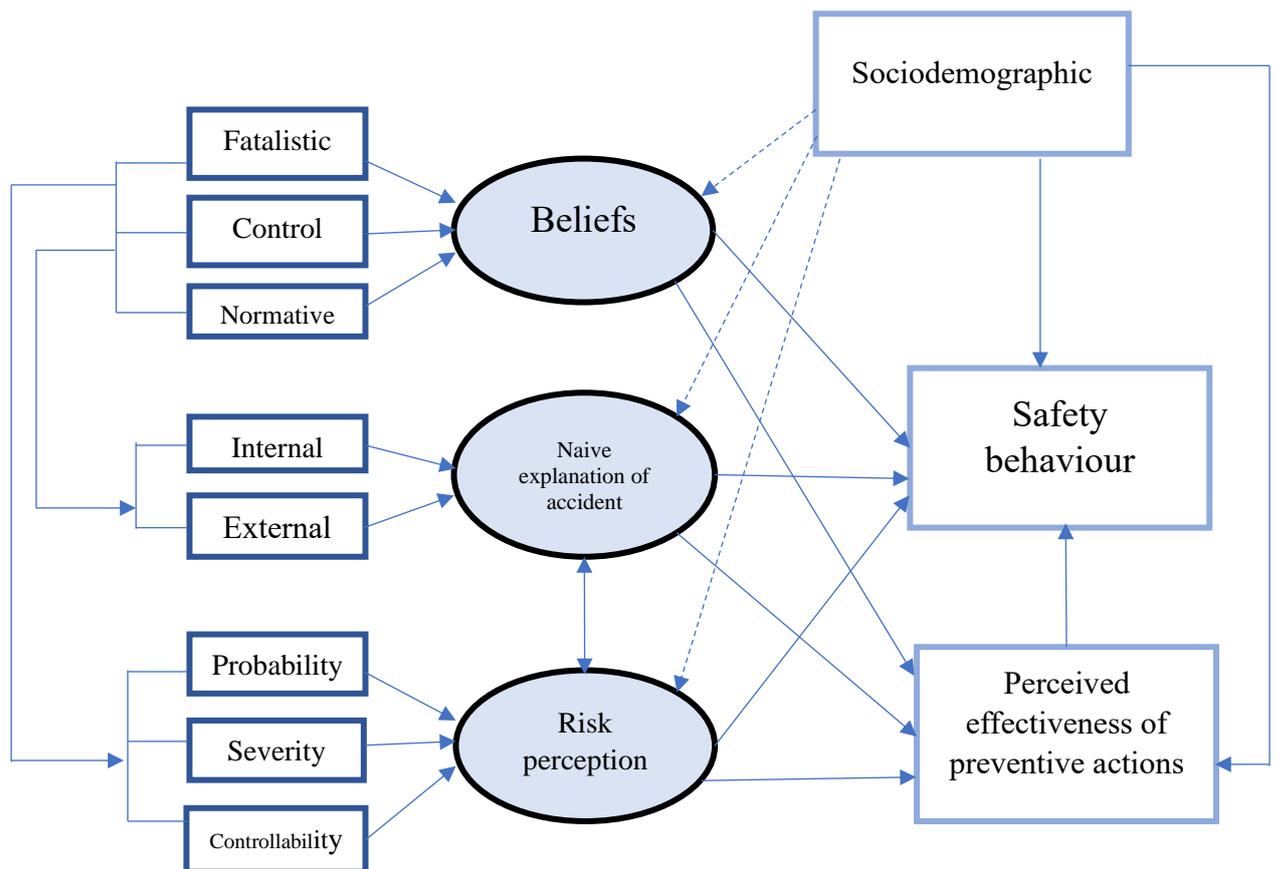


Figure 7: Safety behavior analysis model based on beliefs, naive causal explanation, risk perception, perception of preventive actions and socio-demographic variables

**SECOND PART: EMPIRICAL STUDIES ON
THE ROLE OF BELIEFS, RISK PERCEPTION
AND NAIVE CAUSAL EXPLANATIONS OF
ACCIDENTS ON SAFETY BEHAVIOR**

Chapter 6: Exploratory study of beliefs, risk perception, naive explanation of accidents and perception of prevention actions by hospital staff in Nigeria

Introduction

A viable approach to understanding workplace risks and accidents is by recognizing the perceived causes of accidents by both specialists and the people who are directly involved in the accident situation. Regarding this, Kouabenan (1999) expressed the view that naive expression of accident causes by ordinary individuals could ameliorate the naive ideas of experts in accident analysis and prevention. Therefore, causal explanations about accident becomes an important subjective approach for identifying fundamental accident factors and their influence on the actions of the actors. In this study, the opinions of a sample of Nigerian health care workers on risks and accidents were investigated using a standardized, open-ended interview as a tool to elicit information on risks, causal explanation of accidents, individual beliefs about these accidents, their perception of preventive actions and the likely behaviour of a healthcare worker towards risks and accidents. The primary objective of the study is to identify the perceived causes of accidents in the health sector, the consequences of these accidents on workers, workers perceptions about risks inherent in their job and the possible actions that inhibits or promotes safety in the health sector.

1. Problem

Analysis of accident situations aimed at prevention can be somewhat complicated because certitude in inferring accident causes could be difficult, this is because conditions in which accident happens is mostly ambiguous (Kouabenan, 2013).

Therefore, exploring accident causal explanations directly from workers enhances the knowledge about risk and accident situations at the workplace. According to Koslowski et al. (2008) and Tversky & Kahneman, (1974), causal explanation is based on the cognitive processing of information available to an individual who gives the explanation because the strategy in establishing the cause of an event is apparent in the available information. However, Pernanen (1993) outlined some points to express the limitations of causal explanation as a cognitive activity. He notes that humans have limited cognitive ability, making issues such as causal explanation questionable. Secondly, causal attribution is purposive and is subject to change. Thirdly, causal attributions are influenced by individual language. This signifies that meaning and communication of the causal explanation depends on the context. On the part of Janmaimool and Watanabe (2014) they note that the major bone of contention in issues concerning risk decision making comes from the failure in risk communication between lay persons and experts, which is prompted by differences in reasoning and understanding of the risk situations among the parties involved. Consequently, it will be of essence to consider the socio-cognitive mechanisms of workers at all levels of an organization to significantly improve accident analysis and achieving actors' involvement in safety actions (Kouabenan, 2009). Irrespective of the variations in perspectives of different researchers on factors that could influence individual causal explanations, they have not in any way countered the usefulness of the naive causal explanation as a means of generating information for understanding the causes of accident and workers behaviour. Again, despite the biases of experts and laypersons, their naive causal explanations of accidents are yet essential for accident analysis. This is because they all provide fundamental information on the causes of accident which depicts individual mind frame and orientation about accident.

Therefore, we anticipate that with interview, we can have a good insight into how healthcare workers define risk, the way they explain the accidents they face at work, how they perceive risks in their environment and the likely behaviours towards accident prevention.

2. Objectives of the present study

This study is designed to meet the following objectives: 1) to explore HCWs perceived causes of accidents in Nigerian health sector for clarity in understanding the true situation of accident. 2) to explore healthcare workers definition and their perception of risk 3) to establish how HCWs define risk and their patterns of causal explanations of accident in their profession 4) to analyze HCWs beliefs about accidents that happen at work 5) to investigate HCWs perception about preventive actions 6) Finally, to understand the likely behaviour healthcare workers put up at work.

3. Methodology

3.1. Participants

This study was carried out in the South-Eastern zone of Nigeria with 45 health workers from both public and private hospitals. The participants all consented to participate in the study without any form of reward. The categories of participants were doctors (n = 20), laboratory scientists (n = 9) and nurses (n= 16). The sample was made up of 21 males (n = 46.7%; Mean age = 40.19 years), and 24 females (n = 53.3%; Mean age = 31.42 years). Majority of the workers were recruited from the public health sector (N= 29). Also, most of the participants were doctors (N=20; Mean age= 38.75years). The

summary of the characteristics of study sample, the mean, standard deviation and the percentage are shown in table 3.

Table 3

Summary of the study sample

Variables	N	%	Variables	Mean	Std. D
Gender			Age		
<i>Male</i>	21	46.7	<i>Male</i>	40.19	11.81
<i>Female</i>	24	53.3	<i>Female</i>	31.41	8.02
Hospital type			Work experience		
<i>Public</i>	27	60	<i>Male</i>	13.3	9.78
<i>Private</i>	18	40	<i>Female</i>	6.8	6.97
Job category					
<i>Doctors</i>	20	44.4			
<i>Lab. Technicians</i>	9	20.0			
<i>Nurses</i>	16	35.6			
Total	45	100			

3.2. Material

A systematic interview guide was adopted for this study. This method of qualitative research was chosen because it is an effective means for generating possible information on any event. Although many methods of research have been used to explore occupational accident such as survey, experiments, reports etc. According to Gill et al. (2008), interview can be used to examine beliefs, perceptions, experiences, and motives of individuals. Moreover, different strategies have been used to obtain information for analyzing accident and accident causes, but Gill et al., (2008) indicated that interview has been a useful and frequently used tool in carrying out qualitative research in the healthcare sector.

To develop the interview guide of the present study, the first draft of the interview guide contained 24-items which were used for the pre-test study. Based on the responses of the participants in the pre-test session, I discovered that question 8 (“what do you think about accidents that happen in general?”), was not clear to 2 participants out of 4 participants that took part in the pre-interview. The reason was that participants asked for explanation before they could give an answer to question 8. Also, another participant gave answers to question 8, referring to motor accidents. As a result of the non-coherence of question 8, we adjusted the interview guide by removing the question 8 entirely and replacing it with question 11 (“what do you think is the reason why accidents happen in your workplace?”). Moreover, question 3 (“what do you think about these risks in the health sector? Do you think they can cause accident in the health sector?”), was also eliminated from the guide because the responses given by the participants were not relevant to the study. These questions were removed leaving 22 questions in the final interview guide. The questions centered on the variables of interest (risk perception, explanation of accident, beliefs, perception of preventive actions and safety behaviour). Furthermore, 5 out of the 22 questions were on socio-demographic variables while the last question was meant to give participants the opportunity to ask questions.

In addition, for analyzing the questions in the interview guide and stating the results, the questions in the interview guide were grouped into 8 sections based on the similarity of the information contents of each question. This grouping was for the purpose of clarity and easy assimilation of the interview outcome. The categories include:

1. Definition and perception of risk: this category consists of two questions which highlight: 1) the definition of risk by health care workers, 2) the various risks HCWs perceive in their workplace (questions 1 & 2).

2. Consequences of risk: in this category of the interview questions, the consequences of risk to healthcare workers were examined. HCWs were asked to say the consequences of the risks they face at work (question 4).

3. Definition of accident and naive explanation of accident: the questions here are for information on how HCWs define accident and their causal explanations of accident that happen at their workplace (questions 6 & 7).

4. Beliefs: this part provides information on HCWs beliefs about the accident that happens at their workplace (question 8).

5. Safety behaviour of HCWs at work: The theme in this category was on what HCWs do when face with risk, what they do to manage risks and what they do to avoid risks in the health sector (questions 3, 5 & 9).

6. Perception of preventive actions and HCWs participation in the perceived actions: this category was meant to understand HCWs perception of preventive actions. This includes HCWs awareness of preventive actions, the list of the actions they are aware of, and their participation in those actions they are aware of (questions 10, 11, 12,).

7. HCWs perceived efficiency of management's actions and HCWs priority actions for curbing accidents: the intention here was to explore the efficiency of the actions of the management to curb accident and diseases in the health sector and to examine the safety actions HCWs consider as priority in curbing accident and diseases in the health sector (questions 13 & 14).

8. The socio-demographic variables: this section contained the socio-demographic make-up of the participants, namely gender, age, length of service year, job category, department, level of education (questions 16 – 20). Finally, the last question was intended to give the participant opportunity to ask questions. The final draft of the interview guide

contains 22 items and for each of the items, the participants were meant to give their opinion on the subject matter and their demographic data.

3.3. Procedure

Participants of our study were selected through simple random sampling from among the public and private hospitals located in the South-East Nigeria. Approvals for the interview were obtained from the management of the various hospitals. After that, the health workers were approached individually for their consent for participation. Once a participant grants his/her consent for participation in the interview, he/she was engaged in a face-to-face interview that was fully recorded with participants' permission for proper transcription and analysis. All the responses were also written down in the process of the interview to ensure backup and to avoid loss of information.

Three categories of health workers were chosen for this study, and they include doctors (professional and general practitioners), laboratory scientists/technicians and Nurses (professional nurses and mid wives). These categories of health workers were chosen because they all face similar risks at work (E.g., risk of splash of bodily fluid, risk of needle prick injury etc.). Each session of the interview lasted for an average of 20 minutes.

4. Results

The results of the interview analysis were outlined according to the categorization of the questions in the interview guide as explained earlier under the Material section. The categories were based on the theme of each question. For this reason, the results as stated did not follow the sequence of the questions in the interview guide. Thematic

analysis was used to analyze the content of the interview responses. Firstly, the responses of the participants were transcribed and indexed by labelling relevant phrases. Secondly, codes were categorized into themes and sub-themes. Moreover, some sub-themes were further grouped into sub-categories based on the similarity of the information dominant in each item. Also, the categories of the themes were labelled which are the main results of the study. Finally, for each question, there are variations in the number of occurrences of the responses which were categorized into themes. This is because of the fact that a participant can give multiple points while responding to a question. Therefore, the more points an individual made responding to a question, the more the number of occurrences for that question. The results of the analysis are stated as follows:

4.1. Healthcare workers definition and perception of risk inherent in their work

This section of analysis is concerned with identifying how healthcare workers define risk and to understand their risk perception. In this regard, HCWs were asked to explain risk in their opinion and to list the various risks they perceive at their workplace. This will give insight on the various risks that challenges HCWs in their daily service to humanity. Their responses to these questions are analyzed in the following 2 subheadings.

4.1.1. Healthcare workers definition of risk

The definitions of risk giving by the HCWs were categorized into 15 subtitles and 6 main themes. It shows that HCWs define risk as any factor that has the potential to cause harm (34; 46.58%), a negative outcome of an event (15; 20.55%), the probability of an accident occurring (10; 13.69%) and the ability to control a situation or an

unavoidable danger (controllability) (8; 10.96%). Also, HCWs defined risk as any action with uncertain outcome (unpredictability) (5; 6.85%) and any common situation (familiarity) (1; 1.37%). The breakdown is seen in fig 8:

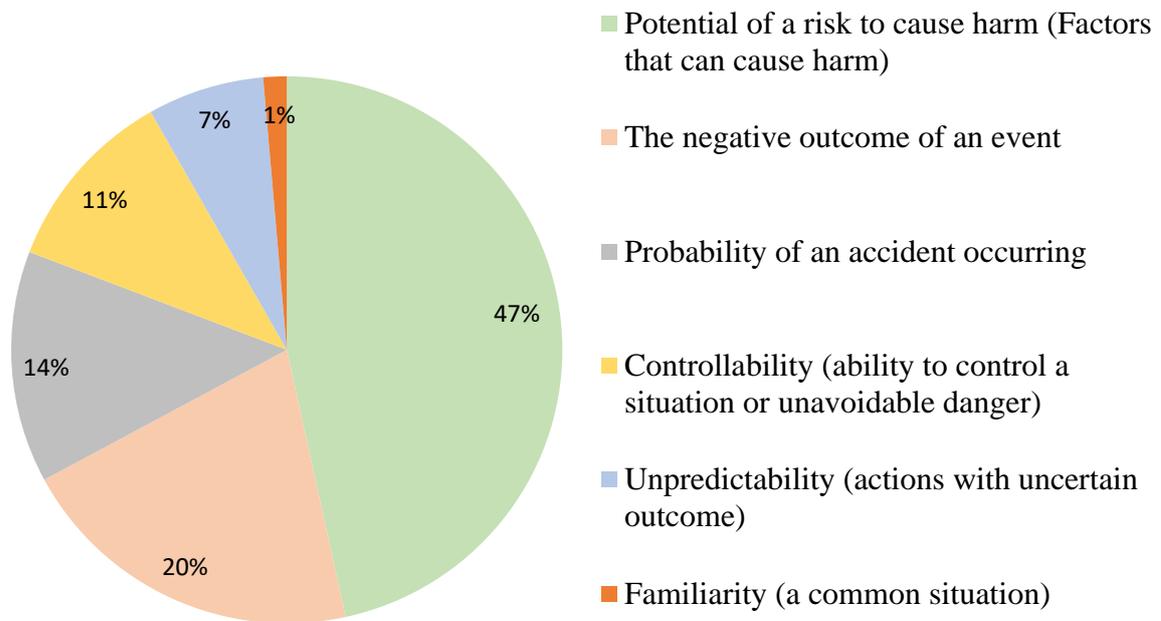


Figure 8: HCWs definitions of risk

Beyond the definitions of risk by HCWs, they also gave their responses to the various risks they perceive in their workplace. These risks as expressed by the healthcare workers are outlined in the following paragraph.

4.1.2. HCWs perception of risk inherent in their work

The risks perceived by the HCWs were identified and were categorized into 62 themes, 22 main themes and 3 subcategories. These 3 categories include biological risks (137; 57.83%) (E.g., risk of infection from bodily fluid, risk of getting retroviral diseases etc.), physical risks (76; 32.06%) (E.g., risk of injury from sharps, risk of physical attack

from patients and patient relatives etc.), and other categories of risks (24; 10.11%) (E.g., risk from bad practice, psychological risk etc.). The percentage of each category is based on the number of responses from the overall responses (237) for identifying the risks in the health sector. The categories are seen in Figure 9.

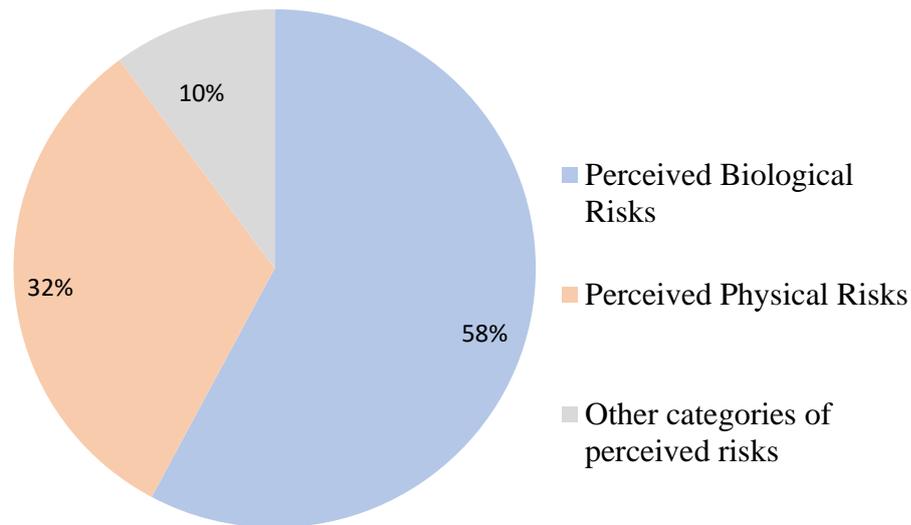


Figure 9: Subcategories of risks perceived by HCWs in the health sector

Details of each subcategory of HCWs perceived risks are outlined in the following paragraphs:

A. Perceived biological risks by HCWs

From analysis, the biological risk subcategory was further grouped into 9 main themes. The 3 major risks that were mostly perceived by the HCWs are risk of infection from contact with blood and bodily fluid (36; 15.20%), risk of retroviral infection such as HIV (28; 11.81%) and risk of contracting Hepatitis infection such as Hepatitis C and B (26; 10.97%). The least identified biological risk was risk of infection from bad practice (not washing hands and not observing standard rules and ethics) (2; 0.84%). Figure 10

below shows the importance of the different categories of biological risk as perceived in the healthcare sector by HCWs.

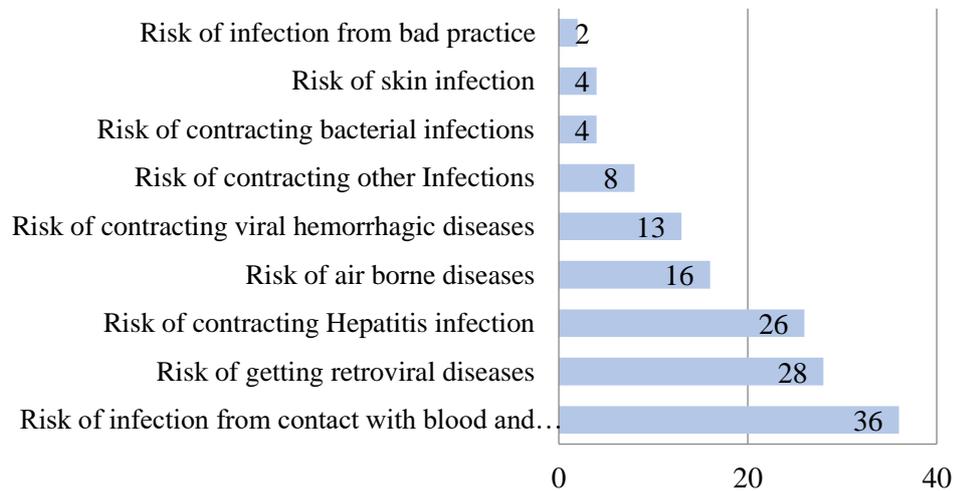


Figure 10: perceived biological risks by HCWs

B. Perceived physical risks by HCWs

Like in the category of biological risk, HCWs identified the various forms of physical risks which were characterized into 6 main themes. Within this category of physical risk, the risk of injury from sharps (34; 14.35%) (e.g., needle prick injury and injury from cuts) was the highest category of physical risk HCWs perceive at work, then the risk of physical attack from patients, relatives (22; 9.28%) and risk of injuries from work equipment (7; 2.95%). The distribution is seen in figure 11:

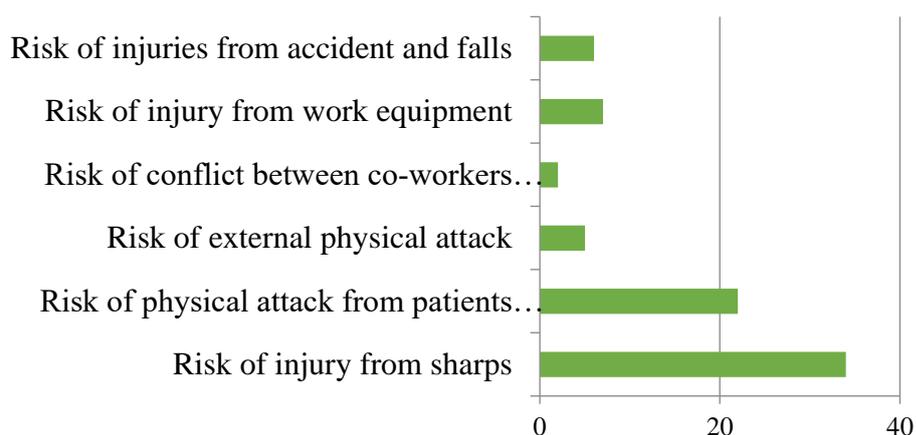


Figure 11: Perceived physical risk by the HCWs in the health sector

C. Other categories of perceived risks by HCWs

Apart from the biological risks and physical risks, there are other forms of risks perceived by HCWs. These risks were grouped as “other categories of risk” They include: risk from bad practice (e.g. risk of complications in practice) (7; 2.95%), psychological risk as a result of distress (6; 2.53%), chemical risk (e.g. risk of corrosion or cancer) (4; 1.69%), social risk like sexual harassment by superiors (2; 0.84%), financial risk which is the financial burden of taking care of oneself when exposed to infection (2; 0.84%), environmental risk (e.g. poor ventilation) (1; 0.42%) and others (2; 0.84%). From among this list of risk categories, the risk from bad practice and psychological risk were mostly mentioned, while environmental risk was least mentioned. The number of responses for each category can be seen in figure 12.

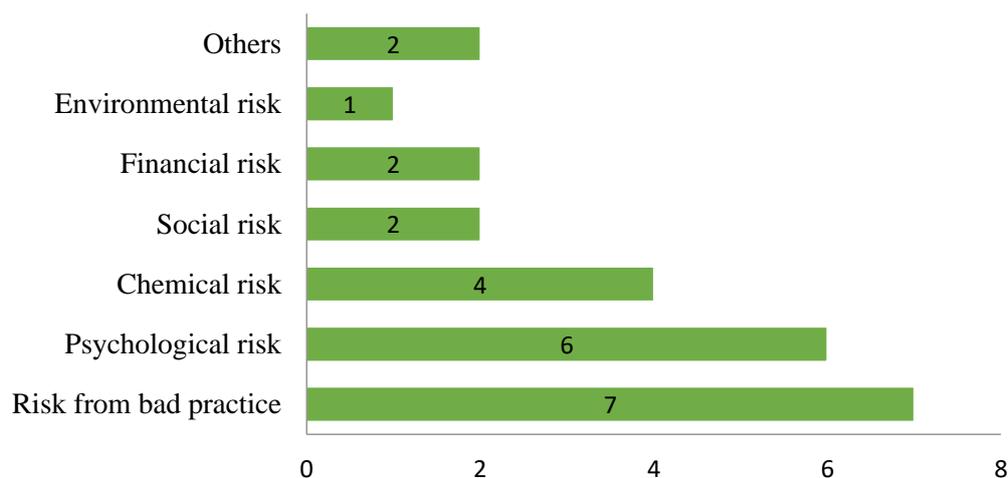


Figure 12: Breakdown of the other categories of risk perceived by HCWs at work

More so, apart from highlighting the details of risks HCWs perceive at work, they also perceive consequences of these risks on them. These perceived consequences were listed by the healthcare workers and the analysis of their responses on the perceived outcome of risks is stated below.

4.2. Analysis of the perceived consequences of risks on HCWs in the Nigerian health sector

The perceived consequences as listed by the HCWs were categorized into 3 subcategories: biological consequences (57; 41.61%), physical consequences (21; 15.33%) and other categories of risk consequences (59; 43.06%). Figure 13 outlines the distribution of these risk consequences for each subcategory. Notably, the number of responses in each category makes up for the percentage of that category from the overall responses (137) on the perceived consequences of risk.

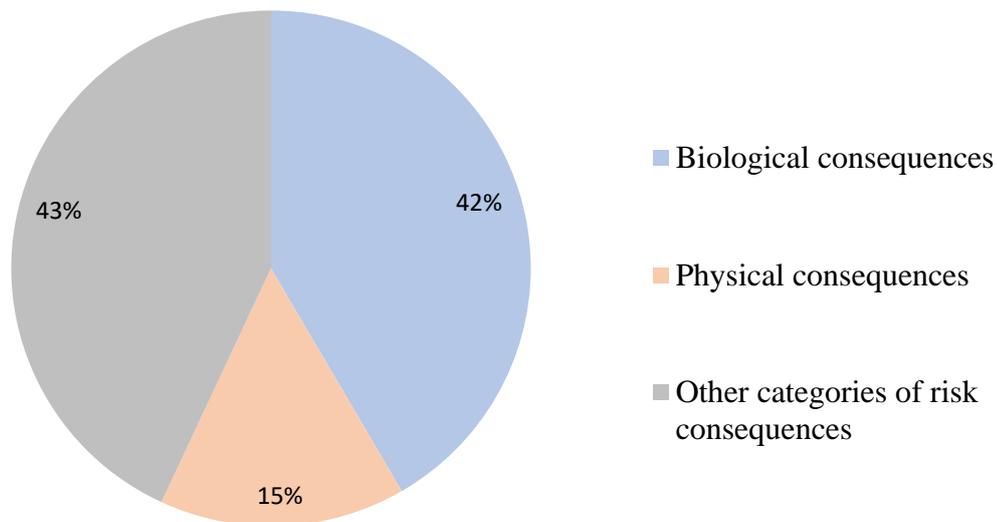


Figure 13: Categories of perceived risk consequences in the Nigerian health sector

The 3 main categories of the perceived consequences of risks are elaborated in the subheadings below:

A. *Perceived biological consequences of risk*

The biological consequences of risks were further grouped into 7 main themes and the most mentioned biological consequences were contracting infectious diseases and infecting family members (28; 20.44%), then falling sick or getting ill (e.g., High blood pressure) (12; 8.76%). Other perceived biological consequences are contracting retroviral infection such as HIV (6; 4.38%), getting airborne diseases like Tuberculosis (5; 3.65%), and contracting Hepatitis infection (3; 2.19%), being infected with skin infections (chicken pox, measles, etc.) (2; 1.46%) and contracting hemorrhagic diseases (e.g., Lassa fever, Ebola) (1; 0.73%). See figure 14:

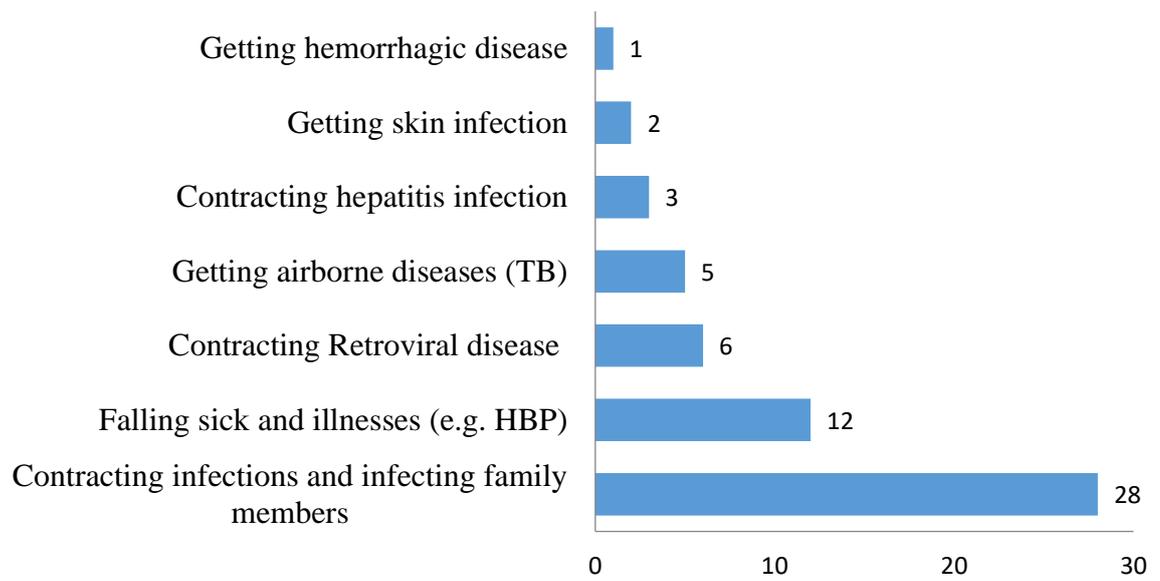


Figure 14: Perceived biological consequences of risk in the health sector by HCWs

B. Perceived physical consequences of risk among HCWs

Similarly, there were 3 different categories of the physical consequences of risk and the analysis show that most of the HCWs indicated the physical consequence of getting injury and damaging the body part (e.g., blindness) (16; 11.68%). Other categories of physical consequence of risk include being stressed (4; 2.92%) and having electrical injury (1; 0.73%). The distribution of these physical outcome of risks are shown in figure 15. All other risks consequences that did not fall under the biological and physical risk consequences were categorized under the group labeled other consequences.

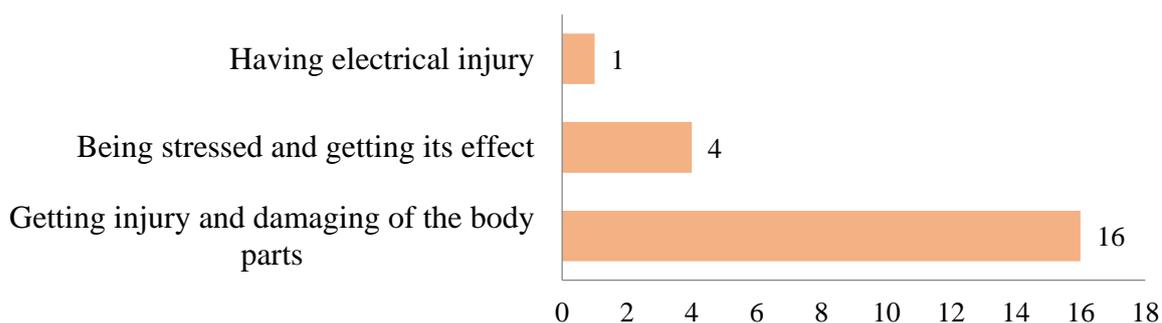


Figure 15: Breakdown of physical consequences of risk perceived by HCWs in the health sector

C. Other categories of perceived risk consequences by HCW

Other categories of risk consequences mentioned by HCWs are fatal injuries (death) (18; 13.14%), turnover and reduced services (18; 13.14%), psychological consequences (12; 8.75%), financial consequences (such as paying for one’s medical bills when exposed to infection) (7; 5.11%) and problem with management and patient (4; 2.92%). The description can be seen in figure 16 below.

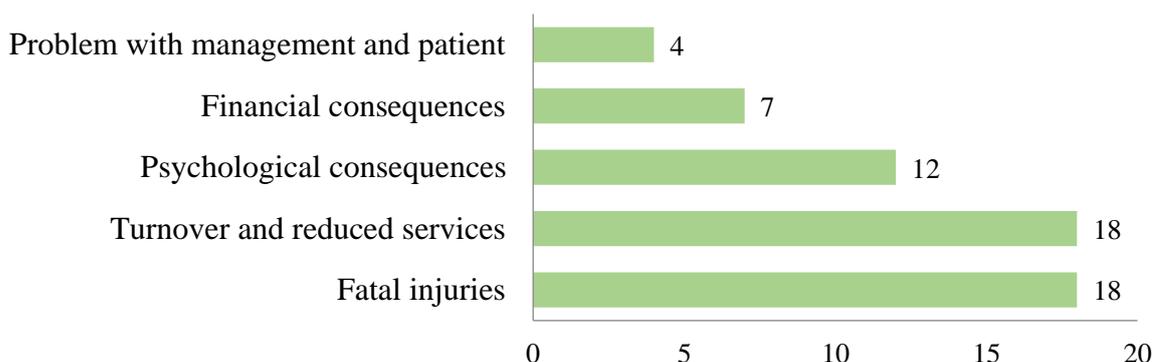


Figure 16: Other categories of the perceived consequences of risk in the healthcare sector

Generally, the biological consequence of contracting infectious diseases and infecting family members (28; 20.44%) is the most perceived consequence of risk in the health

sector, followed by fatal injuries (18; 13.14%), which have the same importance with the risk consequences of turnover and reduced services (18; 13.14%). The fourth major perceived consequence of risk is the problem of falling sick or getting ill (e.g., high blood pressure) (12; 8.76%) and psychological consequences (12; 8.75%) which are somewhat the same importance. The analysis of HCWs responses indicated that the biological consequences are the mostly perceived in the health sector.

Risks give rise to accidents workers encounter at work. More so, risk and accident are perceived to exist with consequences. In the previous sections, we examined HCWs perceived risks and their perceived risk outcome. So, in the next part of our study, HCWs definition of accident and their naive causal explanation of accidents that happen in their workplace were analyzed. This will help in understanding how health care workers define accident and what they perceive as the cause of the accidents that endanger their lives at work.

4.3. HCWs definition of accident and naive causal explanations of the accidents observed in the health sector

This section is in 2 parts which are the definitions of accident by the HCWs and their naive causal explanation of accident. The spontaneous explanations by HCWs are causes attributed to be responsible for accidents that happen at work.

4.3.1. Accident definitions according to HCWs

The aim here is to understand what the word “accident” means to HCWs. Their responses to the question “in your own opinion, what is an accident?” were categorized into 3 main themes. Majority of the HCWs defined accident as unplanned or unexpected incidence (40; 83.33%) indicating accident to be a sudden incidence without premonition

of its occurrence. Other HCWs defined accident as an unwanted incidence (5; 10.42%) that no one wishes to experience and some other respondents' defined accident as preventable negative outcome (3; 6.25%). The breakdown of the sub-themes can be seen in figure 17.

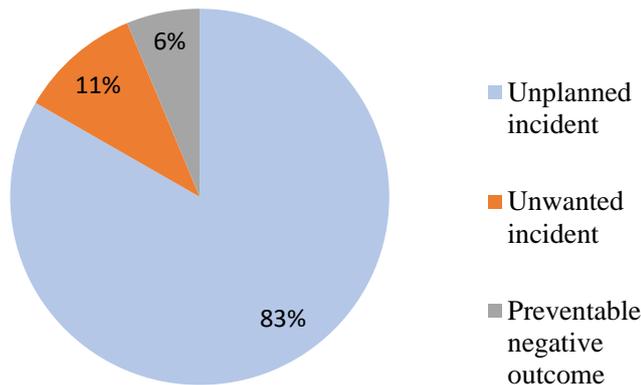


Figure 17: Definitions of accident by HCWs

4.3.2. Causal explanations of accident by HCWs

When considering HCWs naive explanation of accident that happened in the health sector, majority of the responses indicated external causal explanation (67; 51.15%). External causes of accident are causes that are related to the environment or as a result of situational factors. These are referred to as external locus of causality by Heider (1958). Other responses depict internal causal explanations (64; 48.85%). The internal causes of accident are those causes that are linked to personal causes. These are also known as internal locus of causality, whereby the causes of events are inherent in the actor's behaviour and/or characteristics. Furthermore, the external and internal causal explanations of accident given by HCWs were categorized into 4 sub-categories which are 1) controllable external explanation (38; 29.01%) like causes related to faulty

equipment and 2) uncontrollable external explanation (29; 22.14%) (E.g. attack from patients and relatives), 3) controllable internal explanation (52; 39.7%) (E.g. failure to give enough attention to avoiding harm), 4) uncontrollable internal explanation (12; 9.15%) (E.g. is the tiredness of the health care worker). Figure 18 shows the overall percentage of each category of causal explanation of accident by HCWs.

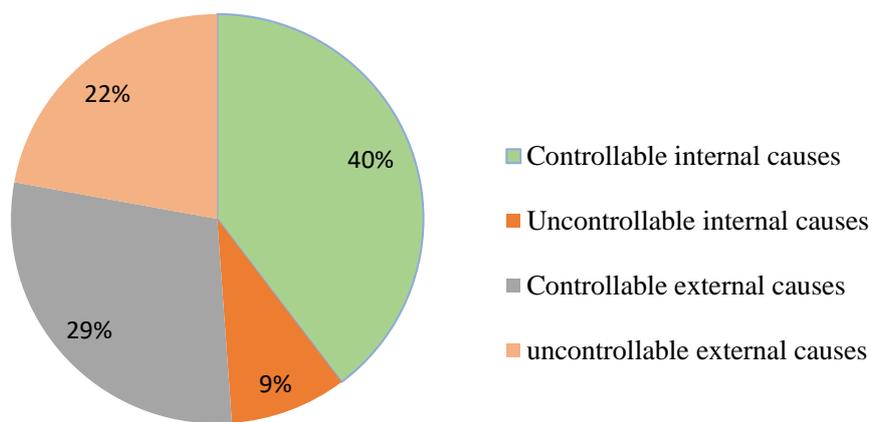


Figure 18: Breakdown of the categories of causal explanation of accident

Generally, failure to give sufficient attention to avoiding harm (26; 20%), improper safety practice and not following rules (18; 14%) were the major causes of accident in the health sector as indicated by HCWs. These mostly identified causes of accident are all internal causal explanation of accident. The categories of the causal explanation of accident by HCWs can be seen in table 4.

Table 4

Naive causal explanations of accident in the health sector by HCWs

What do you think is the reason why accidents happen in your workplace?		Subcategories	No of occurrence	Ratio
1	Failure to give enough attention to avoiding harm	Controllable internal Causes	26	19.85%
2	Improper safety practice and not following rules		18	13.74%
3	Lack of training and bad use of equipment		8	6.11%
		Total	52	39.7%
4	Tiredness of the worker	Uncontrollable internal causes	4	3.05%
5	Conflict and poor communication among health workers		4	3.05%
6	Lack of organization		3	2.29%
7	Not being motivated		1	0.76%
		Total	12	9.15%
8	Lack of safety equipment and facilities	Controllable external causes	12	9.16%
9	Wet, dirty and poorly arranged environment		9	6.87%
10	Causes related to faulty equipment		8	6.11%
11	Poor working conditions (no security, no electricity)		6	4.58%
12	Low quality or inferior equipment		2	1.53%
13	Management's failure to care for situations		1	0.76%
		Total	38	29.01%
14	Uncontrollable and emergency situations	Uncontrollable External causes	12	9.16%
15	Unknown and natural causes		8	6.11%
16	Attack from patients and relatives		6	4.58%
17	Difficult surgery and situations		2	1.53%
18	Lack of personnel		1	0.76%
		Total	29	22.14%
TOTAL			131	100%

The analysis of the naive causal explanation of accident by HCWs was followed by investigating their beliefs about the accidents that happen in their workplace. Belief is perceived to have a link with spontaneous explanation of accident. For example, a study by Patwary et al. (2012) recorded that, workers who feel that they have no control over

accident explains accident to be as a result of management inability to provide personal safety materials. Therefore, it is pertinent to explore the various kinds of beliefs HCWs have. This will give a clear direction as to the nature of belief that will be employed in analyzing the relationship between HCWs naive causal explanation and belief. HCWs responses to the question on their beliefs about accident are outlined below.

4.4. Healthcare workers beliefs about accident that happen at workplace

In this section of the interview analysis, we explored HCWs beliefs on the accidents that happen in their workplace. From the responses of the HCWs, it was indicated that most of the HCWs have the notion that accident is bound to happen no matter what one does and that accidents that happen are unplanned (21; 34.43%). This form of belief is grouped under the category of Fatalistic belief which means a belief that events are predetermined and human beings are powerless to change them. Example of fatalistic statement HCWs made was “accidents are bound to happen”. Other forms of belief indicated from the HCWs responses were belief that accident is caused by mans’ errors (20; 32.7%), control belief (e.g., accidents are preventable) (18; 29.51%), and the divine control belief (e.g., accidents happen because God allows it) (2; 3.27%). The distribution of these beliefs is shown in figure 19.

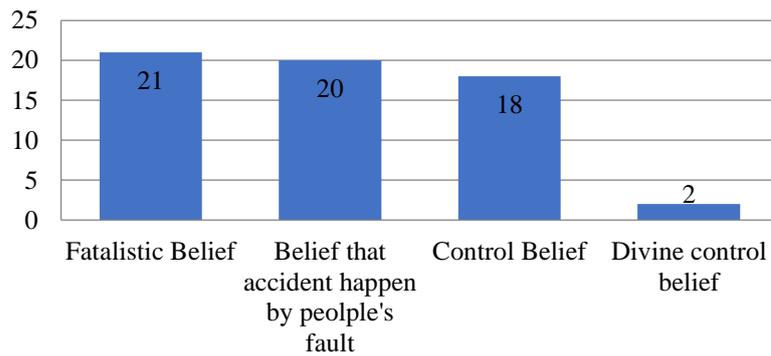


Figure 19: Healthcare workers beliefs about accidents at workplace

In the previous analysis, we analyzed the risk perception, perceived risk consequences, naive causal explanation and beliefs of HCWs concerning accidents. Hence, it is also important to examine the likely behaviour of the HCWs towards the risks they face at workplace. Studies have shown that individuals' behaviour can be influenced by certain subjective characteristics such as belief, risk perception and naive explanation of accident. In a study by Kouabenan and Ngueutsa (2016), control belief was found to have a significant positive relationship with individuals' involvement in hygienic and safety behaviour. Also, Gaivoronskaia (2006) found that people who perceive the risk of allergy tend to avoid falling prey to allergic foods by going for food products that are void of allergens. Therefore, to ascertain the kind of behaviour that exists among the HCWs in their workplace, HCWs were asked to give answers to what they do to avoid accident. This question was to explore how much HCWs react towards risk and to understand the likely actions they take to control risks and accident. In essence, it will be of importance to understand HCWs notion about risks and accidents and likewise their reactions towards these situations they face at work. Their responses on the actions they take to avoid risks are stated in the next part of the interview analysis.

4.5. HCWs safety behaviour at workplace

To understand HCWs safety behaviours at workplace, three questions were asked to the participants to elicit information on the safety behaviour of HCWs in different work situations. Firstly, we explored the safety behaviour of HCWs when faced with risk; secondly, the safety behaviours of HCWs to manage risk. The third question in this category centers on the safety behaviour of HCWs to avoid accident at work. The categories of the safety behaviours for each situation (when faced with risk, to manage risk and to avoid accident) that demands the safety behaviour of a HCW, is elaborated in the subsequent paragraphs. There are similarities in the safety behaviours as listed by the HCWs but the number of occurrences in each category differs. The next 3 paragraphs show HCWs safety behaviour when they are faced with risk, their behaviour to manage risk and their behaviour to avoid accident.

4.5.1. Safety behaviour of HCWs when faced with risk

Basically, HCWs responses to the question “what do you do when faced with risk?” show that health workers mostly use personal protective equipment (51; 33.33%). Then, knowing the nature of the risk involved in any situation at work and the prevention method or materials needed to handle the risk (16; 10.46%), cleaning affected part and taking post exposure prophylaxis when exposed (16; 10.46%). Others includes: taking hygienic measures such as washing of hands (9; 5.88%), avoiding risky situations (9; 5.88%), trying to save life (9; 5.88%), screening themselves when exposed and suspending work (7; 4.58%). Table three below shows the categories of safety behavior of HCWs when they are face with risks.

Table 5

HCWs safety behavior when faced with risks

What do you do when you are faced with risk in your work?	No of occurrence	Ratio
1 Using personal safety equipment	51	33.33%
2 Knowing the nature of the risk involved and the prevention method or materials	16	10.46%
3 Cleaning affected part and taking post exposure treatment	16	10.46%
4 Taking hygienic measures (washing hands, lab, coat, sterilization)	9	5.88%
5 Avoid risky situations or quitting the job	9	5.88%
6 Trying to save life	9	5.88%
7 Being careful and cautious (cautious actions)	7	4.58%
8 Screening and suspending work when exposed	7	4.58%
9 Handle sharp and sharp objects with care	6	3.92%
10 Report accident, incident or violent cases to management or officers	6	3.92%
11 Application of work standards and ethics	4	2.61%
12 Cleaning workplace and hospital environment	3	1.96%
13 Establishing or keeping good relationship with patients	3	1.96%
14 Ensure availability of safety equipment	2	1.31%
15 Others	5	3.27%
TOTAL	153	100%

Part A on safety behavior is about what HCWs do when they are faced with risk. In the following we analyzed HCWs responses on what they do to manage risks at their workplace. Exploring safety behavior of HCWs from different dimensions will help in understanding what is obtainable as to the kind of safety behavior HCWs put up at workplace. In this regard, further questions were asked to the HCWs which were analyzed in part B and C on safety behavior. The questions are “what are you doing to manage risk?” and “what do you do avoid risk?” The results of the analysis are stated in the section below.

4.5.2. Analysis of HCWs safety behavior to manage risks at work

Like the responses of what HCWs do when face with risks, here, HCWs were asked “what are you doing to manage risk in your workplace?” From their responses, it was noted that the primary thing health care workers do to manage risks is the use of personal protective equipment (70; 41.42%). This is followed by handling sharp objects carefully (17; 10.06%) which also have the same percentage of responses with taking hygienic measures like washing of hands and sterilization of hospital equipment (17; 10.06%), among others. Again, relying on God is the least mentioned (1; 0.59%). Figure 20 shows the perceived safety behaviors of HCWs to manage risks at work.

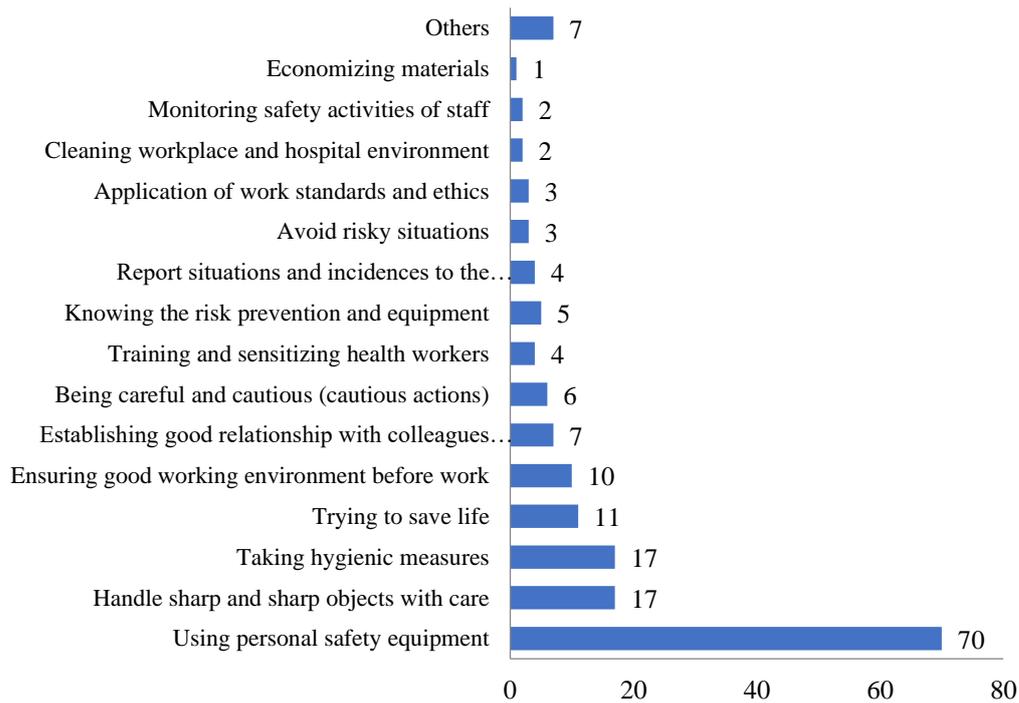


Figure 20: HCWs perceived safety behavior to manage risks at work

As previously stated, HCWs perceived safety behaviors were analyzed based on different conditions. The previous parts were on HCWs perceived actions when they are directly facing risks and their actions to manage risk situations. This third part of the

analysis is on HCWs responses concerning their perceived safety behaviour to avoid harm at work. All these analyses on perceived safety behavior of HCWS are vital for building the points that will make up the items on safety behavior for subsequent studies. The analysis of the perceived safety behavior to avoid accidents is stated below.

4.5.3. HCWs perceived safety behavior to avoid accidents in the workplace

Here, HCWs behaviors to avoid accidents at work were explored by the question “what do you do to avoid accidents in your workplace?” In trying to avoid accidents that happen at workplace, the HCWs mostly attest to the use of personal safety equipment (33; 21.71%). The second most mentioned safety behavior to avoiding accident in the workplace is to know the risk that is involved and the prevention method to combat the situation (19; 12.5%). Other obvious actions that are mentioned include being careful and cautious (14; 9.21%), training of HCWs (12; 7.89%) and cleaning, arranging workplace and hospital environment (9; 5.92%). Providing durable and functioning equipment was the least point in the analysis of what health workers do to avoid accident. Figure 21 shows the safety actions carried out by the HWCs to prevent accidents

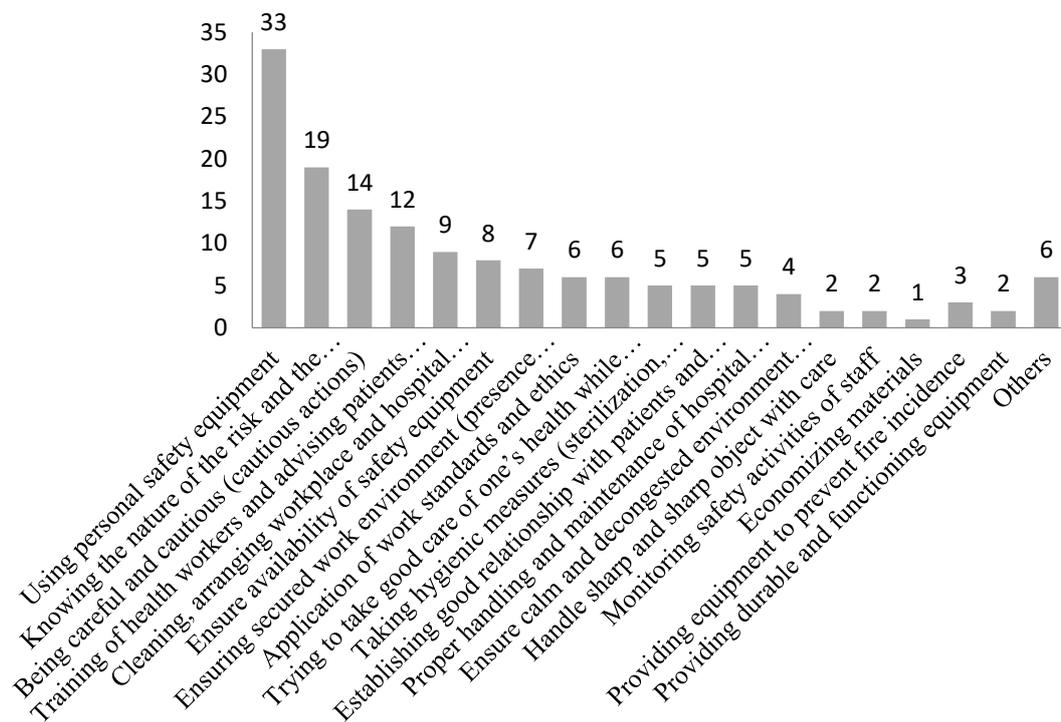


Figure 21: HCWs safety behavior to avoid accidents in the healthcare sector

The different analysis of the possible safety behavior HCWs engage in, either when they are faced with risk, their behavior to manage risk or their behavior to avoid accidents showed that the use of personal protective equipment is the most common form of safety behavior HCWs put up in the health sector. Also, taking hygienic measures were mentioned across all the risk situations where the application of safety behavior is necessary. Figure 22 shows the different themes of safety behavior HCWs adopt at work when faced with risk, to manage risk or to avoid accident.

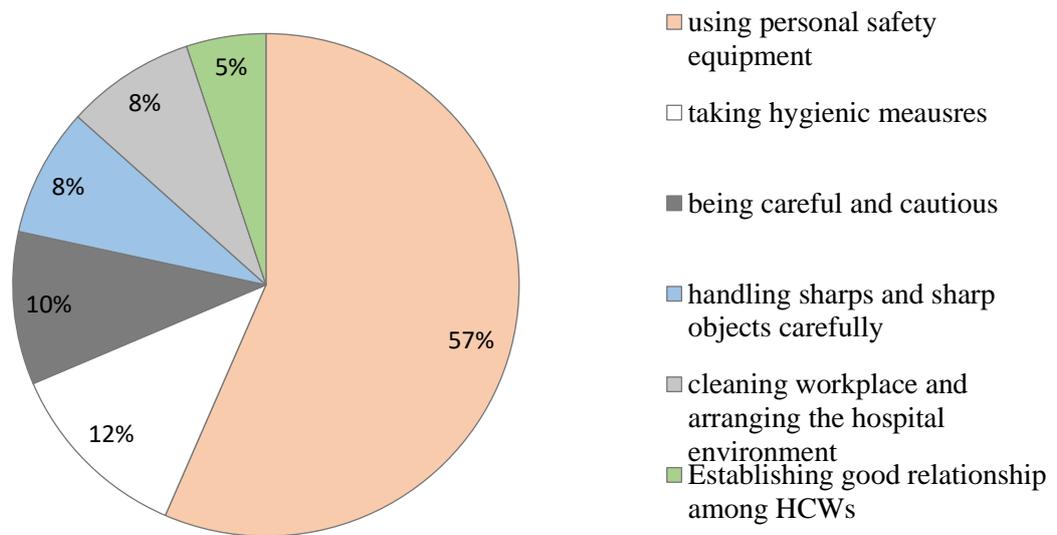


Figure 22: Comparison of the safety behavior of HCWs in different situations

In the previous section (3.4.4), the safety behaviors of HCWs to handle risks were examined. The following paragraph presents the analysis of HCWs responses on their awareness of the perceived safety actions that are being carried out in their workplace and how much they take part in those safety actions. The responses to the question “are you aware of the various actions that are being undertaken in your health sector?” were to establish the level of knowledge HCWs of those actions being carried out in their organization. Also, they were also asked if they have taken part in those actions that they believed to be carried out in their place of work. This will further strengthen our understanding of the safety behaviors HCWs carry out to mitigate risk and accident at work. The result of the analysis on their awareness of perceived safety actions are stated below:

4.6. HCWs perception of preventive actions and their participation in the perceived preventive actions

This section was to determine if HCWs are aware of the actions that are carried out in hospitals to curb accidents and diseases and what these actions are. Safety actions are very vital in any organization especially risk prone workplace. Nevertheless, it is important to see if HCWs are aware that something is being done around them to mitigate risk and accident at work. This will help us understand their level of sensitivity to safety actions and what these actions are. The analysis to the question, “are you aware of the different actions undertaken in your health sector to prevent diseases or accidents in your health sector?” is stated below.

4.6.1. HCWs awareness of preventive actions in the health sector

Healthcare workers responses to the question about their awareness of the various actions undertaken in the health sector to curb accidents and diseases were categorized into 4 themes. Majority of HCWs indicated that they are aware of the safety actions being carried out in their health sector to curb accidents and diseases (38; 84.44%). Some few other HCWs mentioned that they are not aware of any action (4; 8.90%). Also, few others responded that they are aware of the actions to curb accident and diseases in the health sector, but these actions are not enough (2; 4.44%). The final category mentioned that they are aware of some of the safety actions and not all (1; 2.22%). These responses are illustrated in figure 23.

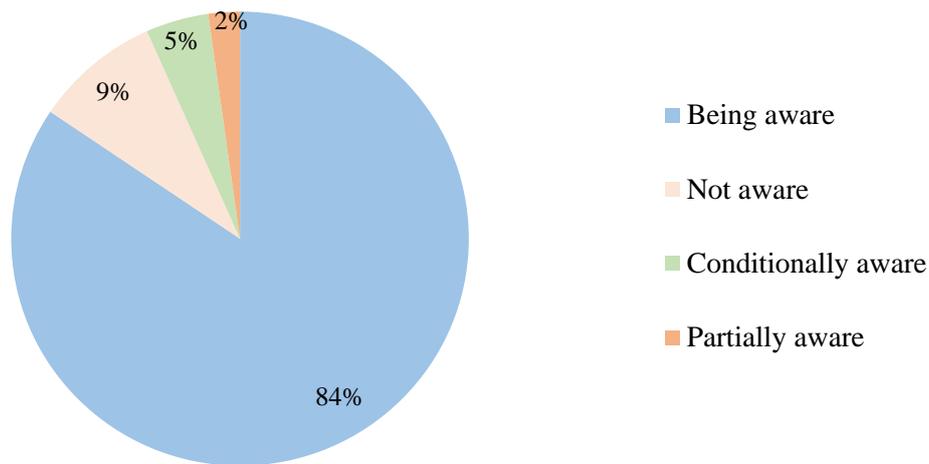


Figure 23: Categorization of HCWs awareness of preventive actions in the health sector

The preceding subtitle shows list of actions HCWs are aware of in their workplace. These actions were listed by HCWs, to back up their responses on their awareness of preventive actions they perceive in their place of work.

4.6.2. Perceived preventive actions HCWs are aware of to curb accidents and diseases

The respondents, who attested that they are aware of the safety actions in health care sector, gave the list of the actions they are aware of while the HCWs who responded they are not aware did not give any list of actions but responded “no action”. The list of actions mentioned by health care workers, were grouped into 10. From the analysis of the HCWs responses, majority of them were aware of the training and sensitization programs on safety (31; 20%). The subsequent categories of actions HCWs are aware of are, provision of personal protective equipment (25; 16.13%), using personal safety equipment (24; 15.48%), provision of equipment for disposing sharps and other wastes

(12; 7.74%), cleaning workplace and arranging the hospital environment (12; 7.74%).

The list of perceived actions is seen in table 6

Table 6

Perceived preventive actions HCWs are aware of to curb accidents and diseases

Can you give me the list of these actions?		No of occurrence	Ratio
1	Training and sensitizing health workers and patients	31	20%
2	Providing personal safety equipment	25	16.13%
3	Using personal protective equipment	24	15.48%
4	Providing equipment for disposing sharps and other wastes	12	7.74%
5	Cleaning workplace and arranging the hospital environment	12	7.74%
6	Providing water facilities for hand washing and maintaining hygiene	7	4.51%
7	Constructing the right building structures	7	4.51%
8	Taking hygienic measures (hand washing, sterilization, personal hygiene)	7	4.51%
9	Screening, vaccination and treatment of health workers	6	3.87%
10	Being careful and cautious	4	2.58%
11	Providing equipment to prevent fire incidence	3	1.94%
12	Appointing infection team	3	1.94%
13	Ensuring a secured work environment (security, maintaining visiting hours)	3	1.94%
14	Providing hospital materials for patients	1	0.65%
15	Maintenance of hospital equipment	1	0.65%
16	Trying to take good care of one's health while caring for others	1	0.65%
17	Establishing good relationship among health care workers	1	0.65%
18	Rely on God	1	0.65%
19	Handling sharps carefully	1	0.64%
20	No action	4	2.58%
21	Others	2	1.28%
TOTAL		155	100%

To gain further insight on the perceived preventive actions of the HCWs, they were asked of their participation in the preventive actions they mentioned. The question “have you taken part in any of these actions?” was to know if they are involved in the preventive actions they perceive at work. Their responses on their participation in the perceived prevent actions were analyzed below.

4.6.3. HCWs participation in the perceived preventive actions

Here, majority of the respondents attest positively that they have undertaken in the safety actions in their workplace (43; 96%), while fewer participants responded “NO” (2; 4%).

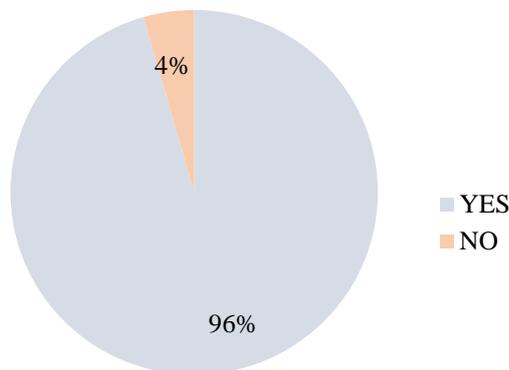


Figure 24: HCWs participation in the perceived preventive actions

Moreover, some of the participants went further to mention the various things they have taken part in. From their responses, majority of the participants indicated that they take part in training and conferences (12; 30%); the second major action is the application of safety practices such as use of personal safety equipment (10; 25%). Others include, reporting hospital need to management or officers (3; 7.5%), assessing workers safety (3;

7.5%), taking hygienic measures for safety (3; 7.5%) and cleaning workplace and arranging the hospital environment (3; 7.5%). The breakdown of all the actions is seen in figures 25.

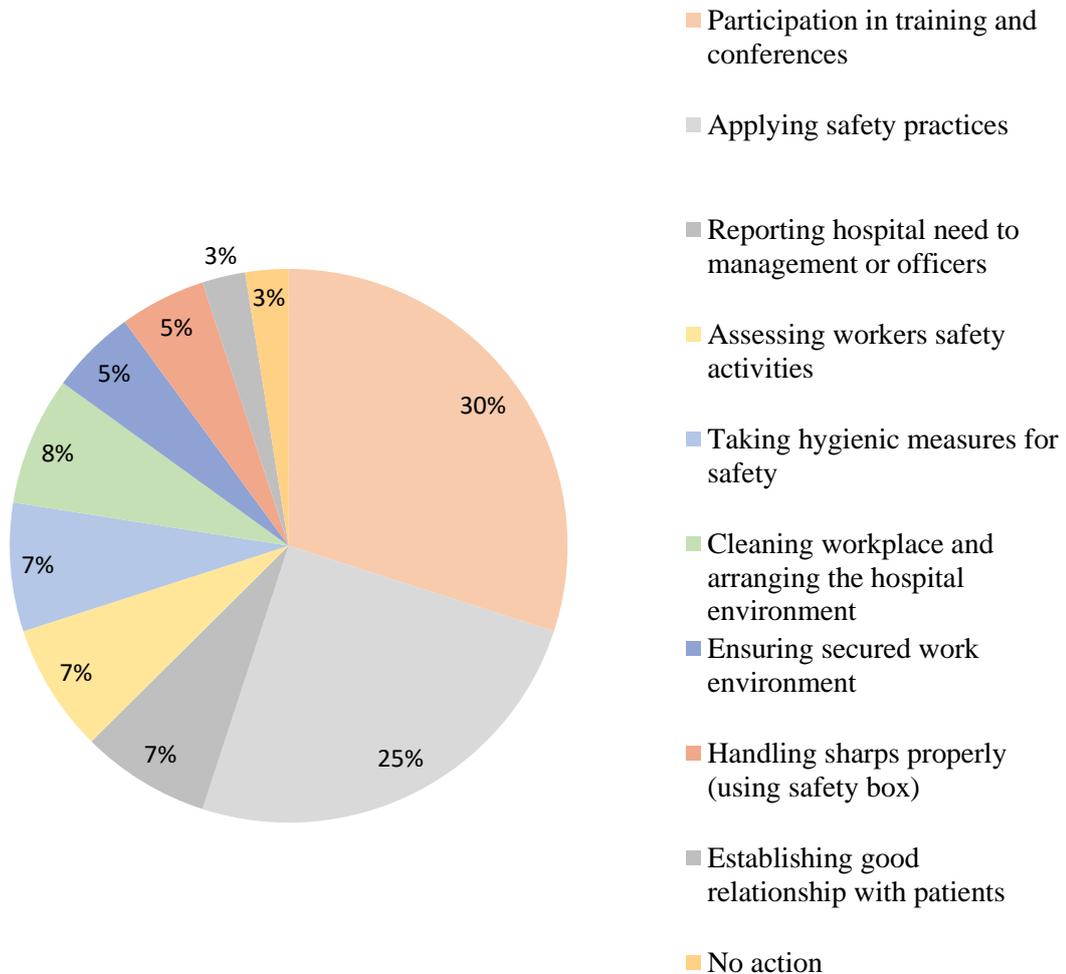


Figure 25: Perceived preventive actions participated in by HCWs

Having analyzed HCWs responses on their perceived preventive actions and their participation in those actions, it is also important to explore their perceived efficacy of the actions management takes to prevent risk and accident in the health sector. In this regard, HCWs were asked the question “what is the efficiency of the actions that are

undertaken by the management? If no, could you explain why you think they failed? If yes, why?" The report of HCWs responses is stated as follows:

4.7. Analysis of HCWs perception of the efficiency of management actions to prevent accidents

Here we analyzed HCWs perception of the efficiency of actions that are undertaken by the management in the health sector against risks and accidents. The interview data concerning management actions to curb accident were analyzed in two parts. The first part shows the main themes of the categories of perceived efficiency while the second part shows the reason for each level of efficiency. Also, we established HCWs preferences of the action they consider more important in curtailing accident and diseases in the health sector.

4.7.1. Healthcare workers perception of preventive actions undertaken by the management

Considering the health care workers perception of preventive actions by the management, their responses were categorized into 3. Firstly, most HCWs are of the opinion that management actions are efficient (23; 48.94%). Secondly, some considers the measures implemented by managers to be partially efficient (16; 34.04%) and thirdly, a little number of HCWs considered management actions as not being efficient (8; 17.02%). The analysis is illustrated in figure 26.

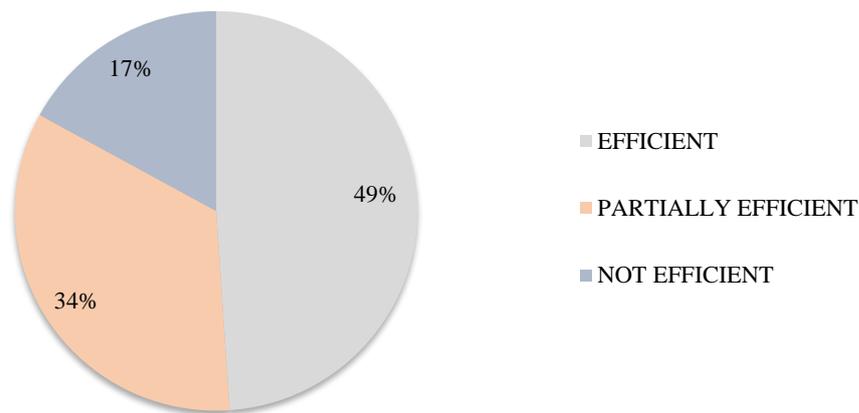


Figure 26: HCWs perception of preventive actions by the management

4.7.2. HCWs reasons for their perception of the efficiency of management actions

Here, we analyzed the reasons given by the health care workers to justify their view about the preventive actions undertaken by the management to manage risks in the health sector, why they are efficient or not. These reasons were categorized into 3 subcategories which are reasons they are efficient, reasons they are partially efficient and reasons they are not efficient. HCWs who perceived that the preventive actions of the managers are efficient gave more reasons (24; 50%) than other HCWs who perceive management actions as partially efficient (e.g., management provides safety and other hospital equipment, accident rate are low and not recurring, the executives organize health workers training and conferences etc.). HCWs who perceive preventive actions of the management as partially efficient (15; 31.25%) gave their reasons to be that management actions to improve safety such as funding is not enough, there is little or no provision of safety equipment etc. Finally, those who perceive management actions as not efficient (9;

18.75%) said there is no action by the management, poor funding, lack of training, etc. The distribution percentage is shown in figure 27.

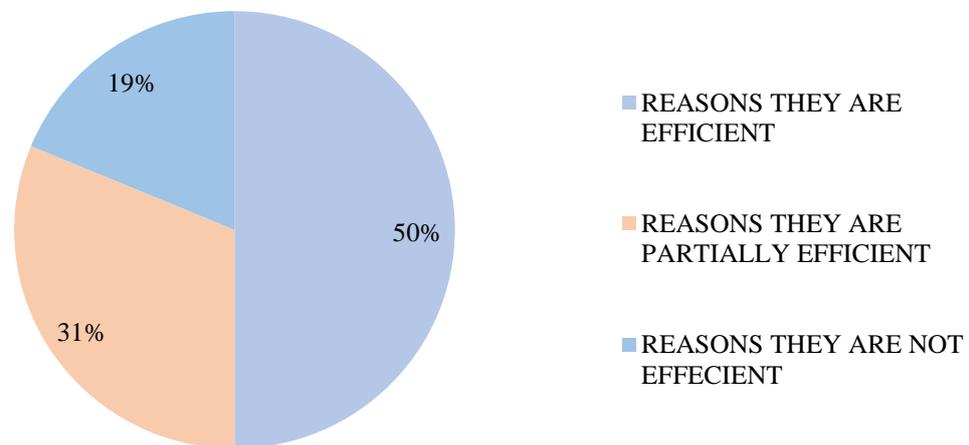


Figure 27: Analysis of the reasons for the categories of the perceived efficiency of management actions

In the previous sections, we explored the various safety actions that are likely carried out in the health sector to curb risks and accidents. We also analyzed healthcare workers responses on their participation in these safety actions and their perception about the efficiency of the actions to curb risk and accidents. The last point is the analysis of the actions HCWs considers as priority in accident prevention.

4.8. HCWs prioritization of safety actions to curb risks and accidents at work

In this section, we examined what preventive action HCWs think is more important in curbing risks and accident in the health sector. The analysis in this section shows that HCWs place priority on organization of trainings and health sensitizations for healthcare workers (28; 28.87%) as a way to control accident occurrence in the hospital.

Other actions that are considered as priority for accident prevention are provisions of personal protective equipment (12; 12.37%), provision and maintenance of hospital equipment (9; 9.28%) and ensuring clean and arranged environment (9; 9.28%). These are the top 4 in the list of the HCWs perceived priority for curbing accident in the health care sector. Figure 28 shows explicitly actions that were considered important in curbing accident in health care sector.

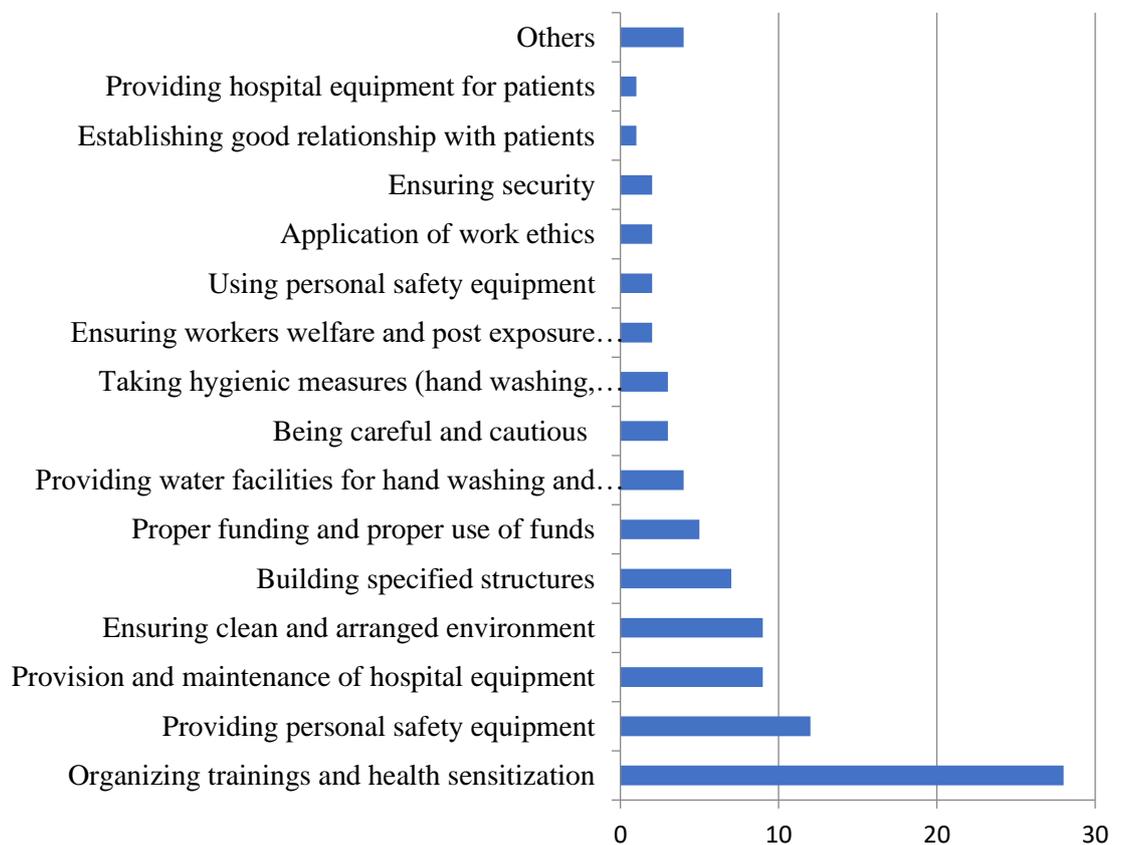


Figure 28: HCWs perceived priority safety actions

5. Discussion

The results of this study are consistent with our objective. The study has revealed the various risks that healthcare workers face in their workplace which include the biological risks, physical risks, psychological risks, chemical risks, among others. These risks as mentioned by the healthcare workers meet with the categories of healthcare hazards as listed on the website of the occupational safety and health administration (United States Department of Labor, 2019 “Healthcare”)

The HCWs also mentioned financial risks (*e.g.*, “*Paying for equipment damaged by you*”) and risks from bad practice (*e.g.*, “*Risk of wrong prescription*”). Consequently, risk from bad practice can lead to litigation. Other risks are social risks (*e.g.*, “*Sexual harassment by doctors to Nurses*”) which are not common in the list of the category of hospital health hazards. The most dreaded risks are the biological risk, and this is in line with the report of Corrao et al. (2012) that the healthcare sector has higher rate of biological risks. Specifically, from the various forms of biological risks listed by the HCWs, risks of infection from contact with blood and bodily fluids, the risks of getting retroviral diseases such as HIV and the risk of Hepatitis infection are the major risks that healthcare workers dread the most. Also, the entire HCWs indicated that risk has the capacity to cause harm. This aligns with the characteristic of risk based on the model of expected utility (Cadet & Kouabenan, 2005) which focuses on the consequences of risky situations. The risks healthcare workers face at work has some consequences which are based on the nature of the risk (*e.g.*, biological consequence, physical consequence etc.). Apart from consequence of death, which is a fatal accident, other consequences are non-fatal, example, injuries and contracting infections. From the analysis of the interview, one-third of the HCWs mentioned death as one of the consequences of health risks. Also,

the risk consequence of contracting infectious diseases and infecting family members was the most mentioned risk consequence by the HCWs.

Furthermore, the analysis of the study on HCWs causal explanation of accidents has shown that naive causal explanation is a constant factor which is implicated in understanding accident causes. Notably, spontaneous causal explanation has been seen to influence people's behavior and thoughts (Kouabenan, 2013). The result of the analysis has proved the importance of the model of Naive causal explanation of accident in understanding the causes of accidents that happen in the healthcare sector. Moreover, the spontaneous causal explanation of accident given by HCWs show that HCWs gave more explanation that are related to external causal explanations and the analysis reveals that accidents are mostly caused by individuals themselves. They gave example such as carelessness and non-observance of work rule which were the most mentioned internal causes of accident. Also, HCWs gave explanations that show external causes such as emergency situations and lack of protective equipment. Additionally, the internal and external causal explanation of accident given by the HCWs, were further categorized into 4 parts: controllable internal causes (e.g., carelessness), uncontrollable internal causes (e.g., tiredness of the worker), controllable external causes (e.g., wet floor) and uncontrollable external causes (e.g., lack of safety equipment). These categories of causal explanation were explored in the model of causal explanation by Weiner (1985). He specified three principal dimension of causal attribution which includes internal or external factors, stability and controllability. Notably, Weiner (1985) concept of controllability refers to an individual's perceived control over an event. Therefore, external controllable causes are those causes that are attributed to the environment or another person which an individual has capacity to control. An example of a situation that

depicts controllable external causes could be lack of safety equipment and facilities. Also wet, dirty and poorly arranged environment are all external factors that can be controlled. Again, uncontrollable external causes are attributed to causes outside an individual, which the person does not have power over. These uncontrollable external causes could be an emergency or molestation by patients and patient relatives. Additionally, internal controllable causes are factors that are attributed to the individual which can be controlled. Example of a scenario of a controllable internal causal explanation is carelessness. This is failure to give enough attention to avoiding harm. While the uncontrollable internal causes are those intrinsic causes that cannot be controlled by the person involved. An example could be workers fatigue, conflict and poor communication among health workers. Many studies have generated results that agree with the importance of recognizing the causal explanations giving by both managers and the employees or layman, as they are influential in understanding their behavior at work (DeJoy, 1994). Causal explanations of accidents are also useful in providing answers to causes of events (Koslowski et al, 2008).

More so, concerning the beliefs of HCWs on accidents that happen at workplace, majority of the HCWs has the belief that accident is bound to happen no matter what anyone does. This depicts the fatalistic belief which indicates peoples' feeling of helplessness about accident that happens. This form of belief has been seen to influence behavior (Ngueutsa & Kouabenan, 2017). From the analysis, other forms of belief were identified among HCWs which includes control belief, which is the belief that one has or has not the capacity to handle risk situations, belief in people's power to cause accident and divine control belief (e.g., "*Accidents happen because God allows it*").

To tackle these risks in the health sector, the HCWs outlined the various actions that are put in place to manage risks and prevent accidents at work. The results of the analysis of these actions concerning risk management and accident prevention reveal that, according to the HCWs, the use of personal protective equipment is the main action to combat risks and accidents. Majority also mentioned that risk is being managed by taking hygienic measures such as washing of hands and sterilization of equipment. Additionally, the outcome of the analysis of the perceived efficiency of the actions undertaken by the management to curtail risk and accident in the health sector showed that most HCWs perceived the management actions as efficient (*e.g.*, “*accident rate is low and not recurring*”). Others HCWs perceived management actions as not efficient (*e.g.*, “*no action is being taken*”, “*Poor funding*”). Some others perceived the actions of the management as being partially efficient, in the sense that actions taken by the management to abate risks and accident are haphazardly done (*e.g.*, “*Safety materials are limited*”).

Finally, actions that are considered a priority for the healthcare workers in curbing risks and accidents at workplace were explored. HCWs indicated that organizing trainings, sensitizing healthcare personnel on safety and the provision of hospital equipment are priority actions needed to improve the situation on risks and accidents in the health sector. The HCWs also stated that trainings that are being organized by the managers are and should be centered on safety tips and on update on current medical practices. They also emphasized on the fact that sensitizing health care workers on the dangers surrounding their work is very vital. The examples they gave on how to sensitize workers includes pasting protocols on walls and visible corners of hospitals and posting reminders on health issues such as cases of Lassa fever or corona virus and the necessary

actions to be taken for safety. All the information on risk and accident, provided by HCWs is essential in understanding the causes of accidents and HCWs perception on risk and accident situation at workplace.

Conclusion

Results of this study may not have been very much elaborated and with lesser statistical analysis, but it has really improved our understanding of the situation of risk and accident in the Nigerian health sector. With reference to the results of the study, we have seen that according to the HCWs, the primary factor responsible for accidents are carelessness of healthcare workers and jumping protocols which are internal causal explanations to accidents. Other factors which are related to external causal explanation of accidents are uncontrollable emergency cases and lack of protective equipment. Since most accident causal factors as explained by the HCWs are internal, it is a good indication that in designing safety measures, there is need to consider individuals' behaviour aside external or technical factors. Therefore, studying the subjective makeup of HCWs would be a good procedure to designing effective accident preventive strategies.

Having buttressed the viewpoint of healthcare workers on risks and accident causes in the healthcare sector, this study will be elaborated across a bigger population of HCWs considering our variables of interest at large (beliefs, perception of preventive actions etc.). This will help us to understand HCWs beliefs, perception about hospital hazards, their perceived preventive actions and the associated behaviour. For further studies of this thesis, we will maintain the population of interest (doctors, nurses, laboratory scientists) as the entire category of health personnel is broad and cannot be covered in a single study. Moreover, our participants face the same risk situations at work.

For instance, all our categories of HCWs are at risk of acquiring all forms of biological infections and diseases, injury from sharps, and exposure to patient or patient relative aggression and other risks as seen in the analysis. This common experience with risk and accident among our population of study will help generate a preventive measure that is acceptable across the different categories of our study.

It is pertinent to note that hospital hazards are influential in causing harm to health personnel which fatality has been recorded over the years and until now. This is evident in the responses of the HCWs who took part in the interview sessions. Moreover, it has been a note of concern that the actual people who implement safety are neglected in the process of developing preventive strategies. This study will create an impact in the safety of HCWs in the sense that healthcare workers will be sensitized across the different categories of health workers and across all levels on the need for a joint contribution in accident causal explanation and prevention. This is because, each individual opinion either from a layman or an expert and their naive causal explanation of things that happen around them is very influential in accident analysis and prevention (Kouabenan, 2013). This will help to fish out some hidden factors which ordinarily may be neglected. Therefore, it is imperative to listen to the need of the workers when proposing preventive measures. For instance, healthcare workers have indicated that the priority action for accident management and prevention is training and sensitization. If these actions are not well implemented, a comprehensive analysis of individual opinion will help indicate the necessary things that need to be strengthened. Hence, further elaboration of our study will contribute to improving the knowledge content of the safety discussions in trainings and sensitization sessions of the healthcare workers.

Chapter 7: Role of beliefs (fatalistic, control and normative) on safety behaviour and on the perception of prevention actions

Introduction

Work accidents constitute a major concern due to its negative impact on both individual and organization. Challenges to its prevention has become a crucial concern in accident management and prevention. Records have shown that human behaviours are mostly identified as major causes of accident (Harith & Mahmud, 2020; Milton & Mullan, 2010; Nazaria et al., 2020; Olejniczak et al., 2018) in both developed and developing countries (World Health Organization, 2013). Therefore, it becomes imperative to understand the factors that influences health and safety behaviour. According to Kouabenan (2009), beliefs and personal characteristics can explain the underlying processes in individuals' adoption of safety behaviour. On this account, several authors (Boua, 2021; Kouabenan, 1998; Kouabenan & Ngueutsa, 2016; Lin & Roberts, 2020; Mayer & Smith, 2019; Milton & Mullan, 2012; Mullan & Wong, 2009; Ngueutsa & Kouabenan, 2017; Rundmo & Hale, 2003; Ugwu et al., 2015; Vekiri, 2010) found that beliefs are fundamental determinants of engaging in health and safety behaviours. For this study, we will focus on fatalistic beliefs, control beliefs and normative beliefs. Our exploratory analysis (see Chapter 6) reveals that fatalistic beliefs and control beliefs are dominant among Nigerian HCWs. Normative beliefs were not established in the exploratory study among Nigerian HCWs. However, there are strong literature that supports the role of normative beliefs on health and safety behaviour (Lin & Roberts, 2020; Milton & Mullan, 2012; Motalebi et al., 2014; Mullan & Wong, 2009; Olejniczak-Serowiec & Rutkowska, 2018; Parker, 2002). Against this background, we will introduce

normative beliefs to observe the extent to which they can influence HCWs behaviour and their perceived effectiveness of preventive actions.

The present chapter aims to explore the role of beliefs (fatalistic, control and normative) 1) on HCWs safety behaviour; 2) their perceived effectiveness of preventive measures; 3) the interaction effect of individual attributes and beliefs on safety behaviour and on perceived effectiveness of preventive actions; 4) to observe if beliefs differ based on personal characteristics.

1. Problems and hypotheses

Beliefs according to Kouabenan (2017) are the way in which an individual views a circumstance or an occurrence, typically in relation to the way in which he perceives his own capabilities to cope with it. Kouabenan (2007) noted that beliefs emerge when people find themselves in uncertain situations with uncertain outcomes. Consequent on these unpredictable situations, people mostly rely on their beliefs to fill in the knowledge gap and to understand situations around them. Notably, there is lack of studies on the relationship between beliefs and behaviour of employees in Nigeria population. Thus, understanding the role of beliefs on the behaviour and perception of preventive actions among Nigerian HCWs, seem to us to be crucial to accident analysis and preventive strategies for behavioural change. This entails taking a subjective approach to understanding factors that motivates individuals' behaviour. These subjective approaches have been applied in several domains such as health behaviour (Ugwu et al., 2015) and traffic behaviour (Ngueutsa & Kouabenan, 2017).

According to Üngüren (2018), considering accident as an unavoidable event resulting from fate, promotes the thought that accidents are bound to happen irrespective

of the preventive measures taken. Hence the belief that accident cannot be controlled by mere human efforts. They can therefore consider preventive actions as less important and are likely to neglect safety precautions (Kouabenan, 1998; Mayer & Smith, 2019; Rundmo & Hale, 2003). This suggests that fatalists may be passive about safety actions. Several authors have proved that fatalistic beliefs are related to non-compliance to health and safety behaviour. For example, a study by Ugwu et al. (2015) on fatalism and unsafe behaviour among nurses show that fatalistic beliefs are related to non-observance of safety protocols. In the same line, Ngueutsa and Kouabenan (2017) observed that participants that are high in fatalistic beliefs do not conform to hygienic and safety behaviour relating to foodborne illness. Additionally, a cross-cultural study by McIlroy et al. (2020) shows that countries whose respondents are high in fatalistic beliefs are associated with non-compliance to safety. With reference to these studies, we intend to observe the relationship between fatalistic beliefs and safety behaviour and perceived effectiveness of preventive actions among HCWs in Nigerian hospitals. Hence, we suppose that fatalistic HCWs will adopt less safety behaviours than non-fatalistic ones (**H1**). Moreover, we anticipate that healthcare workers who have high fatalistic beliefs will perceive preventive actions as less effective than HCWs who have low fatalistic beliefs (**H2**). We also assume that age will moderate the relationship between fatalistic beliefs and safety behaviours (**H3**) and perceived effectiveness of preventive actions (**H4**). Additionally, we presume that accident experience will moderate the relationship between fatalistic beliefs and safety behaviours (**H5**) and perceived effectiveness of preventive actions (**H6**).

Contrary to fatalism are control beliefs which indicates one's confidence in his ability to handle events in the face of risk. Is also referred to as perceived confidence to

overcome in the event of an unseen circumstance (Ajzen, 1991; Wallston, 2001). The study by Milton and Mullan (2012) supports that perceived control is linked with the capacity to apply safety precautions in the face of risk. Likewise, Vekiri (2010) noted that having a deep sense of control over accidents can lead to adoption of safe behaviour. On the contrary, some other authors (Boua, 2021; Ngueutsa, 2012; Ulleberg, 2002) found that control beliefs lead to unsafe behaviour. This is justified by the fact that overconfidence in ones' ability to maneuver risk can make an individual to overlook hazards and thereby engage in insecure behaviour. Thus, we aim to assess the role of control beliefs on healthcare workers in Nigerian hospitals. We will presume that the higher the control beliefs of health workers, the less they adopt safety precaution (**H7**). In addition, we consider that HCWs who exhibit a keen sense of control over hospital risks will perceive precautionary actions as more effective than healthcare workers with lesser sense of control (**H8**). We also propose that age will moderate the relationship between control beliefs and safety behaviours (**H9**) and perceived effectiveness of preventive actions (**H10**). Additionally, we presume that accident experience will moderate the relationship between control beliefs and safety behaviours (**H11**) and perceived effectiveness of preventive actions (**H12**).

In addition, studies have shown a positive link between normative beliefs and safety behaviour (Lin & Roberts, 2020; Milton & Mullan, 2012; Mullan & Wong, 2009). This is evident that people with higher belief in the opinion or behavioural expectation of important people, tend to behave in the way they are expected to. Authors like Ledesma et al. (2018) found that normative beliefs predict engagement in the use of seat belts. Accordingly, Clayton and Griffith (2008) found a positive significant relationship between normative beliefs and caterers' intention to engage in hand hygiene practices. In

Nigeria, people are often and easily judged by others when they believe they are deviating from the expected societal norm. Individuals to a greater extent try to fall in line with the societal views to avoid public criticism and condemnation from the people. Moreover, in Nigeria people like elders, and religious leaders are held in high esteem that citizens tend to strongly adhere to their behavioural opinions. In most cases, religious leaders act as mediators between the government and the citizens to get their followers to comply to certain societal rules and regulations. A study by Muhammad et al. (2015) study on Nigerian sample, show that normative beliefs are positively related with the entrepreneurial intentions. Moreover, study by Etika et al. (2021) found that normative beliefs is a predominant factor in speeding behaviour among Nigerian sample. The study shows that while men associate approve speeding, important others like family members and traffic agencies disapproves of the behaviour. Owing to these findings, we would predict that HCWs that have high normative beliefs will adopt safety behaviour (**H13**) and perceive preventive measures as more effective (**H14**) than those with low normative beliefs. We also assume that age will moderate the relationship between normative beliefs and safety behaviours (**H15**) and perceived effectiveness of preventive actions (**H16**). We hypothesize that accident experience will moderate the relationship between normative beliefs and safety behaviours (**H17**) and perceived effectiveness of preventive actions (**H18**).

Besides, perceived effectiveness of preventive actions is found to lead to engagement in safety behaviour. This is elaborated in the health belief model (HBM, Rosenstock, 1974). The HBM as a behaviour modification model is useful in establishing variations in health behaviour patterns. This model has been applied in behaviour modification studies that establishes how people take decision to engage in safety

behaviour based on their perceived benefits of preventive actions. For instance, a study by Bechard et al. (2021) on the relationship between HBM constructs and adoption of safety behaviour regarding COVID 19, indicates that a high perceived benefits of the preventive health behaviours were the main source of motivation to engage in safety behaviour. Also, Jeihooni et al. (2017) found that Perceived benefits as an element of the HBM is positively linked with actions that targets prevention of osteoporosis. Following these studies, we will predict that HCWs with high perceived effectiveness of preventive actions will adopt safety behaviour than those who have low perceived effectiveness of preventive actions (**H19**).

Finally, we are interested in studying the link between personal socio-demographic and beliefs. For example, Peltzer (2003), found that men are more fatalistic than their female folk, which may explain why men engage more in risky behaviour and their high rate of involvement in accident. We would see if beliefs, safety behaviour and perceived effectiveness of preventive will differ based on personal socio-demographic variables (age, gender, accident experience, professional category, level of education and the severity of accident).

2. Methodology

2.1. Participants

A sample of 611 health workers which includes doctors, nurses and laboratory scientists/technologists were involved in the study. The healthcare workers were recruited from public and private hospitals in the metropolis of three states in the south-east geopolitical zone of Nigeria: Anambra, Abia, and Ebonyi. In total, 978 questionnaires

were distributed and 762 returned which approximate to 77.91% response rate. One hundred and fifty-one (151) participants were excluded from the analysis due to partial filling of the questionnaire. Thus, a total of 611 participants were involved in the final analysis which constitute 62.47% response rate. The participants were made up of 140 (23%) general medical practitioners, 119 (19.5%) specialist medical practitioners, 143 (23.4%) professional nurses, 34 (5.6%) professional midwives and 165 (27%) medical and pathological laboratory scientists/ technologists (10 participants did not indicate their job category). Based on gender, there were 314 (51.8%) females and 292 (48.1%) men (5 participants did not indicate their gender). The participants age ranges between 17 years and 68 years with a mean age of 32.8 years. The years of experience of the participants ranges from 1 to 43 years with mean work experience of 7.43 years. Concerning the level of education, 43 (7.04%) participants have secondary school certificate, 404 (66.12%) have a bachelor's degree and 151 (24.71%) have a post graduate qualification (13 participants did not indicate their level of education). In accounting for accident experience among the participants, 293 (48%) have been victims of hospital accidents while 314 (51.3%) have no accident experience (4 participants did not indicate their accident experience). Among the participants that have experience of accident, 151 (51%) are men and 143 (49%) are women. Four hundred and thirty-two (432, 70.7%) participants were from public hospitals, while 158 (25.9%) participants were from private hospitals (21 responses were missing). The summary of the distribution is outlined in annex 3, p. 357.

2.2. Material

In this section, we describe the scales measuring the three forms of beliefs of the study: fatalistic beliefs, control beliefs and normative beliefs. We also describe the measurement of perceived effectiveness of preventive measures and safety behaviour scale. The description of the scales is presented in the subsequent paragraphs.

2.2.1. Measurement of fatalistic beliefs

The scale measuring fatalistic beliefs was adapted from the fatalism scale developed by Kouabenan (1998) which measures the degree at which the respondents agree or disagree to statements that portrays inevitability of accident in the hospital, resulting from fate. The 6-item scale has 5-point responses ranging from 1 = strongly disagreed to 5 = strongly agreed. The examples of items include, *encountering accident in the hospital is bad luck, there is nothing one can do about it; Very often, the accidents that happen in the hospital are inexplicable phenomenon; When accidents happen, it is because someone somewhere wanted to harm you etc.*

2.2.2. Measurement of control beliefs

The control beliefs scale accesses workers ability to handle and cope with risks in their workplace. The background and knowledge that constitutes the items in the scale is based on the results of the responses of healthcare workers from the interview and from the literature of Ajzen (1985, 1991), Kouabenan et al. (2015) and Wallston (2001). The statement in the scale corresponds to critical situations of healthcare in hospitals and participants were expected to respond to the point that reflects the mastery they think they have in the situations. The 6-item scale has a 5-point Likert-type response which ranges from 1 = strongly disagree to 5 = strongly agree. Examples of these items are, *I can handle*

patients with retroviral infections (e.g., HIV); I have a great ability to predict violence of a patient or patient relative; I can handle needles when giving injections, etc.

2.2.3. Measurement of normative beliefs

The normative beliefs scale assesses the level of recognition and acceptance each participant has for and to do what is recommended by important persons. The item of the scale constitutes assertions a healthcare worker can make and was derived from the outcome of the interviews, Ajzen's theory of planned behavior (TPB) on Normative belief and from the work of Fang et al. (2017) and the one of Javadi et al. (2013). The 6-item scale has a 7- point Likert response with values ranging from 1= I should not to 7= I Should. Participants were expected to estimate the level at which they accept to do what is recommended. The closer they get to 7 the more they accept to do what is recommended by significant others and the closer they get to 1 the less they accept not to do what is recommended. Examples of the items includes "*my Chief medical director thinks that I should use personal protective equipment always when examining a patient; Most of my friends who have had accident at work think that I should use personal protective equipment always when examining a patient; My spouse thinks that I should use personal protective equipment always when examining a patient*" etc.

2.2.4. Measurement of the perception of preventive actions

The scale for measuring the perception of preventive actions was constructed based on the results of the interview and knowledge from the work of Auzoult et al. (2015) and that of Cauzard and Quimby, (2000) on perception of preventive actions. Items in the scale corresponds to the various preventive actions that are being employed in the Nigerian health sectors which were obtained from the responses of the participants. These

responses centers on the degree of the effectiveness of the preventive actions and will determine the content of the questionnaire. Participants are expected to rate the level effectiveness of each action in the prevention of accident and diseases in Nigerian health sector. The responses range from 1 = not at all effective to 5 = very much effective. Some of these items are, *providing personal safety equipment, using personal protective equipment, training and sensitizing health workers etc.*

2.2.5. Measurement of safety behavior

The scale for measuring safety behavior constitutes items that highlights the various risks that are prevalent in the Nigerian hospitals followed by the possible behavioral responses that a HCW can embrace when confronted with these risks. The contents of the scale are based on the results of the interview. The situations presented and corresponding behaviors are the outcome of the responses from healthcare workers in Nigerian hospitals. Odd number items of the scale correspond with items that reflects hospital situations followed by insecure behaviors and the even numbers consists of hospital situations followed by safe behaviors. The odd items were scored on the inverse while the even numbers were scored directly, the total mean score represents safety behaviour. Some of the items measuring safety behaviour are *when there are emergency situations, I get my job done not minding the standard operation procedure; When I predict violence situation, I ensure the presence of a security officer; When I predict violence situation, I ensure the presence of a security officer. Etc.*

2.3. Data collection procedure

The development of the questionnaire for the study follows a sequence of exploratory study by interviews, information from literature and knowledge on the various measurement variables (beliefs, perception of preventive measures and safety behaviour). The exploratory study was carried out with a standardized, open-ended interview guide with 22-items (see Annex 2, p. 355). The interviews were conducted with 45 healthcare workers (doctors, nurses, laboratory technicians/scientists) on an average time of 20 minutes for each participant. The outcome of the analysis of the data from the interviews and the knowledge of the various theoretical concept from literature formed the basis of the items in the questionnaire (see Annex 5, p. 359). A face validity was first carried out by the thesis director and my PhD colleagues from the psychology laboratory. Also, a pretest was also carried out with 35 healthcare workers to determine the validity and reliability of the scale, before the final distribution of the questionnaire.

The process of data collection with the questionnaire follows its administration on healthcare workers at the workplace. Prior to the distribution of the final questionnaire, 4 graduate students from Alex Ekwueme Federal university were recruited and trained to help with the data collection. Their participation was to ease the process and to get many HCWs as possible. The investigators were paid for their participation in the data collection process. At the point of distributing the questionnaire, approvals were first obtained from the heads of departments or supervisors on duty before health workers were approached for their voluntary participation and consent. These HCWs were met in their various sections of the hospitals, including wards, laboratories, consulting rooms, seminar rooms, call rooms etc. The HCWs took an average of 1 hour to complete the questionnaire. Before the participants filled the questionnaire, the investigators first gave a brief explanation on the purpose of research without exposing what is expected from

them. The attentions of the participants were drawn to the instructions on the first line of each scale. All the participants read and filled the questionnaire independently while the investigators stayed around to supervise the questionnaire and made sure they were well filled. Each scale of the questionnaire was introduced with a set of instructions on how to fill it and what the Likert-point stands for. At the end of the questionnaire, some questions on sociodemographic were added to obtain personal information from the participants such as age, gender, education level, job category etc.

3. Results

3.1. Procedure for analyzing the results

Screening and analyses of the data were carried out using SPSS software V.25 and R version 4.1.2. Before analyzing the hypotheses, we carried out a descriptive analysis to summarize the data for each variable. The descriptive analysis comprises of the mean, standard deviations, frequencies, and percentages. Different statistical tests were applied to test our hypotheses. A correlational analysis is applied to determine the relationship between the study variables and the controlling variables (age, gender, education level etc.). Multiple linear regression analyses were used to test the effect of the independent variables on the dependent variables. The sociodemographic variables were introduced as controlling variables in the linear analysis.

Interaction effect among variables were tested with R software version 4.1.2 to run a multiple linear regression analysis and to plot the interaction graph. Before running the interaction test, the independent variables were centered to avoid the issue of multicollinearity (Field, 2018; Huang, 2020). That is a high correlation between predictors that can lower the statistical significance of an independent variable.

3.2. Preliminary data analysis

3.2.1. Mode of validation of the measurement scales

The scales for the study were first pre-validated with exploratory factor analysis (EFA), for the purpose of detecting the internal structure of each instrument. That is to discover factors or latent variables that can parsimoniously describe the covariance among observed variables which are the measured variables (Watkins, 2018). In running the EFA, an inter-item correlation matrix was first used to determine the items to retain before subjecting the items to EFA. Satisfactory inter-item correlation is determined by correlation links between the value of .30 and .90 (Hair et al., 2003) and an item collinearity showing inter-item correlation coefficients of values equals to or less than .80 (Bourque et al., 2006). Items with high collinearity are to be eliminated to avoid multicollinearity between items. The factor extraction process to validate the scales and sub-scales involves Maximum likelihood method with Direct Oblimin rotation. Feasibility of the EFA was determined on two principles: 1) on the principle of Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) which should be greater than .60 (Hutcheson & Sofroniou, 1999; Kaiser, 1970; Kaiser and Rice, 1974; Pearce & Oktadiana, 2019) and 2) on Bartlett's Test of Sphericity with p-value significant at $p = <.05$ (Field, 2018; Pearce & Oktadiana, 2019; Petty et al., 2003). The internal consistency of our measurement scales and subscales were checked with Cronbach's alpha which is considered satisfactory with an alpha value of $\alpha = .70$ (Cronbach, 1951, Kline, 1999).

According to Taber (2018), a satisfactory Cronbach Alpha in most cases is considered equals to or greater than .70 while Griethuijsen et al. (2014) noted that an alpha value of 0.7 or 0.6 is acceptable. To Plummer and Ozcelik (2015), an alpha value less than the expected acceptable threshold does not always mean that the scale is insufficient in measuring its construct.

3.2.2. Validation of the fatalistic beliefs scale

The scale for measuring fatalistic beliefs consists of 6 items. The result of the exploratory factor analysis (EFA) indicates one factor with a satisfactory Cronbach's alpha ($\alpha = .78$). The items of the scale obtained a variable saturation between .39 and .73 and explained 39.44% of the variance. Participants' score for verifying the hypothesis will be realized by the total mean score of the responses on the 6 items. The higher the mean score of an individual, the more the participant believe accident is by fate and feels helpless (see Annex 6, p. 370).

3.2.3. Validation of the control beliefs scale

The scale measuring control beliefs is made up of 6 items with one factor. The scale has a satisfactory Cronbach's alpha ($\alpha = .74$). The items of the scale obtained a variable saturation between .38 and .79. The factor extracted explains 34.85% of the variance. The assumptions of our studies will be analyzed on the total score of participants which will be determined by averaging responses to the 6 items. Higher scores show a strong perceived control (see Annex 7, p. 372).

3.2.4. Validation of the normative beliefs scale

The normative beliefs measurement scale has 6 items. The EFA shows one factor and obtains a satisfactory stratified Cronbach's alpha of $\alpha = .93$. The factor structure of this measurement scale explains 71.39% of the variances and obtained a variable saturation between .81 and .89. For carrying out the analyses, participants' scores will be determined by the average score of responses to the six items. Scores above the average are regarded as strong beliefs in normative while respondents that scores below the average are considered to have low normative belief (see Annex 8, p. 374).

3.2.5. Validation of the perception of preventive action scale

The scale for measuring the perceived effectiveness of preventive actions shows a very high satisfactory reliability ($\alpha = .92$). Exploratory factor analysis on the 8-items scale shows one factor and explains 58.92% of the variance. The variable saturates between .67 and .83. The total score of participants will be determined by averaging responses to the 8 items. Higher scores show a strong perceived effectiveness while lower scores are regarded as low perceived effectiveness of preventive actions (see Annex 12, p. 385).

3.2.6. Validation of the safety behavior scale

The scale measuring safety behaviour has 9 items with a limit internal consistency (.55). The final EFA shows two factors and explains 29.37% of the variance. The first factor is made up of 5 items that measures unsafe behaviour and saturates between .40 and .69. It obtained an acceptable Cronbach's alpha ($\alpha = .65$) and explains 15.89% of the variance. The second factor is made up of 4 items that measures safe behaviour. It obtained

an acceptable Cronbach alpha ($\alpha = .61$) and explains 13.48% of the variance. The items saturate between .46 and .64. Our hypotheses will be tested by inverting the score of the items for unsafe behaviours and calculating the average of the responses of the global scale (see Annex 13, p. 387).

Table 7

EFA and Validation of the scales for fatalistic beliefs, control beliefs, normative beliefs, perception of preventive actions and safety behaviour

Variables	N of items	Total	% of Var	% of CV	r	α
Fatalistic beliefs	6	2.35	39.14	39.14	.33	.77
Control beliefs	6	2.08	34.71	34.71	.33	.74
Normative beliefs	6	4.27	78.14	71.14	.71	.93
Perception of preventive actions	8	4.69	58.61	58.61	.58	.95
Safety behaviour	5	1.43	15.89	15.89	.29	.65
	4	1.21	13.68	29.37	.28	.61

Note: EFA: exploratory factor analysis; N of Items: number of items; % of Var: percentage of variance; % of CV: cumulative variance percentage; r: Mean inter-item correlation; α : Cronbach's alpha

3.3. Descriptive analyses of the data

In this section, we carry out the descriptive analysis to summarize the data for each variable and to explain the intercorrelation between the study scales which includes fatalistic beliefs, control beliefs, normative beliefs, perceived effectiveness of preventive actions and safety behaviour. The descriptive analysis shows the mean score and standard deviation of the data for each scale. This is followed by the analysis of the variation of beliefs according to socio-demographic then the analysis of the principal hypotheses.

3.3.1. Descriptive analyses of the results of the fatalistic beliefs scale

Table 8 describes the mean score of the items for fatalistic beliefs. The order of the mean of the items shows the level at which HCWs agrees to each of the claims people make about hospital work accident. The 5-point Likert-type scale ranges from 1 = strongly disagree to 5 = strongly agree. In general, the mean score for fatalistic beliefs is rather low, which means that the participants in the study have low fatalistic beliefs overall. We see that the items with highest average score are “most risks health workers come across in the hospital are caused by other people” (M = 2.22; SD = 1.09) and “when an accident happens, it is the person’s fate” (M = 2.22; SD = 1.09). The item with the lowest average score is “Before handling a difficult procedure, it is better to consult a seer, you never know” (M = 1.40; SD = .87).

Table 8

Average scores of items measuring fatalistic beliefs

Items	Mean	Std. Deviation
Most risks health workers come across in the hospital are caused by other people	2.22	1.09
When an accident happens, it is the person’s fate	1.71	0.88
Encountering accident in the hospital is bad luck, there is nothing one can do about it	1.61	0.85
Some sections of the hospitals in Nigeria are haunted by bad spirits that can cause accidents for workers	1.44	0.80
When accidents happen, it is because someone somewhere wanted to harm you	1.43	0.68
Before handling a difficult procedure, it is better to consult a seer, you never know	1.40	0.87

3.3.2. Descriptive analyses of the results of the control beliefs scale

Table 9 shows the mean scores of the items measuring the control beliefs of HCWs over hospital critical situations in hospitals. The items of the scale measure the degree of control HCWs feel they have over risk. The 5-point Likert scale responses ranges from 1 = strongly disagree to 5 = strongly agree. The condition that more controlled by HCWS is handling needles when giving injections (M = 4.02; SD = 0.94). Following is the ability to handle patients with retroviral infections like HIV (M = 3.85; SD = 0.96). On the other hand, the participants demonstrate less control in predicting violence from patients or patients' relatives (M = 2.84; 1.04).

Table 9

Average scores of items measuring control beliefs

Items	Mean	Std. Deviation
I can handle needles when giving injections	4.02	0.94
I can handle patients with retroviral infections (e.g., HIV)	3.85	0.96
I have the expertise to handle sharps when carrying out procedure	3.82	0.98
I can manage an emergency	3.62	0.90
My experience enables me to thwart risks in the hospital	3.09	1.04
I have a great ability to predict violence of a patient or patient relative	2.84	1.04

3.3.3. Descriptive analyses of the results of the normative beliefs scale

Table 10 shows the mean scores of the items measuring normative beliefs of the participants. The scale has a 7-point Likert responses. The closer the response is to 7, the more the respondent agrees to the opinion of important others while the closer the

response is to 1 the less, they agree to the opinion of important others. We observed that the scores of the normative beliefs are globally high and very close whatever the significant other. Which means a strong adherence to normative beliefs. We can see from the table that the item with the highest mean score is, the expectations of the spouses of HCWs to the use of personal protective equipment always when examining patients (M = 6.23; 1.32); then the item “most of my colleagues who have had accident at work think that I should use personal protective equipment always when examining a patient” (M = 6.13; 1.34). On the contrary, item with the lowest mean score is “my parents think that I should use personal protective equipment always when examining a patient” (M = 6.13; 1.34).

Table 10

Average scores of items measuring normative beliefs

Items	Mean	Std. Deviation
My spouse thinks that I should use personal protective equipment always when examining a patient	6.23	1.32
Most of my colleagues who have had accident at work think that I should use personal protective equipment always when examining a patient	6.13	1.34
My Chief medical director thinks that I should use personal protective equipment always when examining a patient	6.08	1.39
Most of my relations who have had accident at work think that I should use personal protective equipment always when examining a patient	6.05	1.38
Most of my friends who have had accident at work think that I should use personal protective equipment always when examining a patient	6.00	1.42
My parents think that I should use personal protective equipment always when examining a patient	5.97	1.51

3.3.4. Descriptive analyses of the results of the perception of preventive actions scale

Table 11 shows the mean scores of the items measuring the perceived effectiveness of the preventive actions. The scale is a 5-point Likert scale ranging from 1 = not at all effective to 5 = very much effective. Table 12 show that participants perceive more the effectiveness of training and sensitization of health workers as accident preventive measure (M = 4.45; SD = 0.81), following is the provision of water facilities for hand washing (M = 4.43; SD = 0.87) and the use of personal protective equipment (M = 4.43; SD = 0.83), these are followed by the action of providing equipment for disposing sharps and other biological wastes (M = 4.41; SD = 0.85). Moreover, the least perceived effective action by the respondents is establishing good relationship with patients (M = 4.02; SD = 0.98).

Table 11

Average scores of items measuring perceived effectiveness of preventive actions

Items	Mean	Std. Deviation
Training and sensitizing health workers	4.45	0.81
Providing water facilities for hand washing	4.43	0.87
Using personal protective equipment	4.43	0.83
Providing equipment for disposing sharps and other wastes	4.41	0.85
Providing personal safety equipment	4.31	0.90
Participating in training	4.30	1.01
Arranging the hospital environment	4.13	0.95
Establishing good relationship with patients	4.02	0.98

3.3.5. Descriptive analyses of the results of the safety behaviour scale

The mean scores of the items in table 12 all represents scores for safety behaviour. Mean scores of negative statements represent average score for safety behaviour because the scores were reversed. The scale is a 5-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. We can see from table 12 that HCWs mostly adopt the behaviour of using equipment only when they are sterilized (M = 3.77; SD = 1.04). This is followed by item 2 showing that workers do not handle cases in the absence of protective equipment (M = 3.70; SD = 1.12) and the act of having good rapport with patients (M = 3.65; SD = 1.12). Conversely, the participants of study least observe the behaviour of avoiding close contact with patient during examination (M = 3.65; SD = 1.12).

Table 12

Average scores of items measuring safety behaviour

Items	Mean	Std. Deviation
I use equipment only when they are sterilized	3.77	1.043
When personal protective equipment is not available, I go on to handle cases	3.70	1.12
I don't mind my rapport with patients, I care more about getting the job done	3.65	1.12
When there is no safety box close to me, I use any dustbin around me to dispose needle or sharps	3.58	1.192
When I predict violence situation, I ensure the presence of a security officer	3.56	1.175
When there are emergency situations, I get my job done not minding the standard operation procedure	3.47	1.179
Each time I resume duty, I look out for risk factors at work	3.46	1.021
When I am tired, I take an exciting to stay awake until I finish my work for the day	3.36	1.110

When examining a patient, I avoid close contact with the patient	2.82	1.059
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3.3.6. Relationship between the fatalistic beliefs scale, control beliefs scale, normative beliefs scale, the perception of preventive actions (PPA) scale and the safety behaviour scale

We can see from table 13 that fatalistic beliefs are negatively correlated with perceived effectiveness of preventive actions ($r = -.15, p < .01$) and safety behaviour ($r = -.16, p < .01$). This indicates that workers who possess high fatalistic beliefs are likely to adopt less safety behaviour and perceive less the effectiveness of preventive actions. Additionally, control beliefs are positively related to normative beliefs ($r = .20, p < .01$) and perceived effectiveness of preventive actions ($r = .31, p < .01$). This means that HCWs who have high control beliefs also have high normative beliefs and they have high perceived effectiveness of preventive actions. Also, perceived effectiveness of preventive actions is positively related to safety behaviour ($r = .12, p < .01$). This shows that the more preventive actions are perceived as effective, the more HCWs adopt safety behaviour. Normative beliefs are positively and significantly related to perceived effectiveness of preventive actions ($r = .28, p < .01$). This means that HCWs who have high normative beliefs also have high perceived effectiveness of preventive actions. There is no significant correlation between fatalistic beliefs and control beliefs. Moreover, control beliefs and normative beliefs are not significantly related with safety behaviour.

Table 13

Correlation between fatalistic beliefs, control beliefs, normative beliefs, perceived effectiveness of preventive actions (PPA) and safety behaviour

Variables	M	SD	1	2	3	4	5
Fatalistic beliefs	1.63	.57	1				
Control beliefs	3.54	.65	.01	1			
Normative beliefs	6.08	1.22	.30	.20**	1		
PPA	4.31	.72	-.15**	.31**	.28**	1	
Safety behaviour	3.49	.52	-.16**	.03	.03	.12**	1

Notes: M: mean, SD: standard deviation, PPA: perception of preventive actions

* < .05; ** < .01

3.3.7. Variability of beliefs (fatalistic, control, normative), perception of preventive measures and safety behaviour according to socio-demographic variables

We performed multiple regression analysis to verify whether beliefs, naive causal explanations, perception of preventive actions and safety behavior vary according to sociodemographic variables. Before applying linear regression where applicable with gender, we first recoded gender to represent male as (1) and female as (-1) Therefore, a negative beta coefficient represents female while a positive beta coefficient represents men. Using the linear regression, gender was considered as the independent variable while the predicted variables were the dependent variables. The sociodemographic

variables that were tested across the variables were age, gender, accident experience, professional category, level of education and the severity of accident.

Variations in fatalistic beliefs according to socio-demographic variables

The results indicate that fatalistic beliefs significantly vary according to age. The younger healthcare workers tend to be more fatalists than older ones, $b = -0.13$, $R^2 = 0.17$, $t(611) = -3.34$, 95% CI [-0.01, -0.00], $p = .001$. The outcome of the regression analysis also show that fatalistic beliefs vary significantly with gender $b = -0.10$, $R^2 = 0.04$, $t(607) = -2.55$, 95% CI [-0.10, -0.01], $p = .01$, indicating that women are more fatalistic than men. We recorded a significant link between fatalistic beliefs and accident experience $b = -0.10$, $R^2 = 0.04$, $t(610) = -2.30$, 95% CI [-0.11, -0.01], $p = .02$. This shows that people who have no experience of accident are more fatalistic compared to those who have experienced accident. Moreover, we recorded a significant variation between the healthcare workers professional category and fatalistic beliefs, $b = 0.03$, $t(606) = 3.67$, 95% CI [0.01, 0.04], $p = .001$. Specifically, professional nurses have high fatalistic beliefs ($M = 7.4$) compared to other categories of health workers, General medical practitioners ($M = 1.70$), Medical laboratory scientists and technologists ($M = 1.65$), Professional midwives ($M = 1.44$) and Specialist medical practitioners who scored the least in fatalism ($M = 1.34$). Conversely, there is no significant relationship between fatalistic beliefs and other socio-demographic variables (level of education and severity of accident).

Variations in control beliefs according to socio-demographic variables

We observed a significant effect of age on control beliefs, which implies that the more health workers advance in age, the more they tend to believe they possess the capacity to handle hospital perceived risks, $b = 0.09$, $R^2 = 0.01$, $t(607) = 2.03$, 95% CI

[0.00, 0.01], $p = .04$. We did not establish significant variation between control beliefs and other socio-demographics (gender, accident experience, level of education, professional category and severity of accident).

Variations in normative beliefs according to socio-demographic variables

Concerning the effect of age on normative beliefs, the regression outcome indicates that younger health care workers recognize more the behavioural expectations of important others in their life than do older health workers, $b = -0.14$, $R^2 = 0.20$, $t(611) = -3.53$, 95% CI [-0.03, -0.01], $p = .001$. Therefore, normative beliefs are associated more with younger workers than older ones. Moreover, normative beliefs vary significantly by gender $b = -0.10$, $R^2 = 0.06$, $t(607) = -2.54$, 95% CI [-0.02, -0.03], $p = .01$, indicating that women are more likely to trust referent persons in their life and to do what they expect of them than do men. However, normative beliefs do not significantly vary according to accident experience, level of education, professional category and the severity of accident.

Variations in perception of preventive actions according to socio-demographic variables

The result of the regression analysis displays a trend effect of the level of education on perception of preventive actions, $b = 0.08$, $R^2 = 0.00$, $t(610) = 1.73$, 95% CI [-0.01, 0.21], $p = .08$. This shows that perception of preventive actions is likely to be perceived as effective among workers that have higher level of education. We did not find any significant relationship between here was no significant difference between perception of preventive actions and age, gender, accident experience, professional category and severity of accident.

Variations in safety behaviour according to socio-demographic variables

To verify whether safety behaviour vary according to age, a regression analysis was performed with age as the independent variable and safety behaviour as the dependent variable. The result show that safety behaviour varies significantly with age, $b = 0.01$, $R^2 = 0.00$, $t(610) = 0.17$, 95% CI [0.00, 0.16], $p = .03$. In essence, the more health workers advance in age, the more they engage in safety behaviour. According to level of education, the regression analysis reveals that safety behaviour differs positively and significantly with study level, $b = 0.13$, $R^2 = 0.04$, $t(610) = 2.84$, 95% CI [0.05, 0.28], $p = .01$. This result indicates that safety behaviour varies according to level of education which is an indication that as health care workers get more education, the more they tend to observe safety precautions. Safety behaviour varies significantly among the professional categories, $b = -0.02$, $t(606) = -2.21$, 95% CI [-0.04, -0.00], $p = .02$. It is observed that specialist medical practitioners (gynecologists, pediatricians, surgeons, etc.) are more engaged in safety behaviour ($M = 3.74$) compared to medical laboratory scientists ($M = 3.56$), professional midwives ($M = 3.56$), general medical practitioners ($M = 3.46$) and professional nurses ($M = 3.45$). We find a significant difference in the level of education and the categories of health workers, $b = 0.15$, $t(606) = 6.96$, 95% CI [0.09, 0.19], $p = .001$. Specifically, specialist medical professional had higher level of study ($M = 3.73$) compared to medical laboratory scientists/technologists ($M = 3.10$), professional midwives ($M = 3.03$), general practitioners ($M = 3.01$) and professional nurses ($M = 2.95$). We do not record significant relationship between safety behaviour and gender, accident experience and severity of accident.

3.4. Testing of hypotheses

The hypotheses were tested with multiple linear regression analyses and the socio-demographics were introduced as controlling or moderating variables. We first analyzed the relationship between beliefs and safety behaviour. The next analysis is on the direct relationship between beliefs and perception of preventive actions. Finally, we analyze the combined effect of selected sociodemographic (age, and accident experience) and beliefs on safety behaviour and on the perception of preventive actions.

3.4.1. Role of fatalistic beliefs on safety behaviour and on the perception of preventive actions

Concerning the influence of fatalistic beliefs on safety behaviour, we observed that health workers who have high fatalistic beliefs adopt less safety behaviour $b = -0.15$, $R^2 = 0.06$, $t(611) = -3.70$, 95% CI [-0.21, -0.06], $p = .001$. This result confirms our hypothesis **H1** which suggests that participants who possess fatalistic beliefs will pay less attention to safety behaviour than those who are low in fatalistic beliefs. Also, the outcome of the regression analysis indicates a negative and significant relationship between fatalistic beliefs and perception of preventive actions $b = -0.16$, $R^2 = 0.02$, $t(611) = -3.81$, IC 95% [-0.30, -0.10], $p = .001$. This validates our hypothesis **H2** which states that the more health workers possess fatalistic beliefs, the more they perceive preventive actions as less effective.

3.4.1.1. Moderating effect between age and fatalistic beliefs on safety behaviour and on the perception of prevention actions

Interaction effect between age and fatalistic beliefs on safety behaviour

In this section, we analyzed the interaction link between fatalistic beliefs and age on safety behaviour. Our hypothesis **H3** stipulates that the effect of fatalistic beliefs on safety behaviour will be moderated by age. The result is not significant, $b = -0.01$, $R^2 = 0.00$, $t(607) = -1.21$, 95% CI $[-0.01, 0.00]$, $p = .23$ (see figure 29). This result does not confirm our hypothesis. Hence, the effect of fatalistic belief on safety behaviour is not moderated by age.

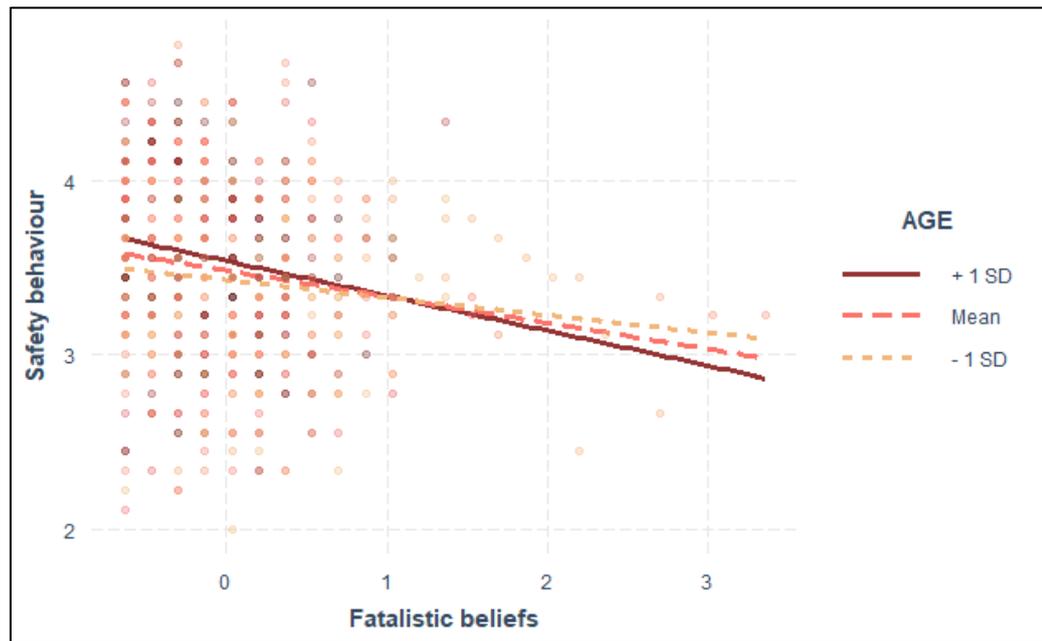


Figure 29: Interaction effect between age and fatalistic beliefs on safety behaviour

Interaction effect between age and fatalistic beliefs on perceived effectiveness of preventive actions

We analysed here the interaction between fatalistic beliefs and age on perceived effectiveness of preventive actions. The regression analysis shows a negative significant interaction effect, $b = -0.02$, $R^2 = 0.01$, $t(607) = -2.41$, 95% CI $[-0.03, -0.00]$, $p = .02$. This result confirms our hypothesis **H4** that the effect of fatalistic beliefs on perceived effectiveness of preventive actions will be moderated by age. The regression slope in

figure 30 indicates that the negative effect of fatalistic beliefs on perceived effectiveness of preventive actions is stronger when HCWs age increases.

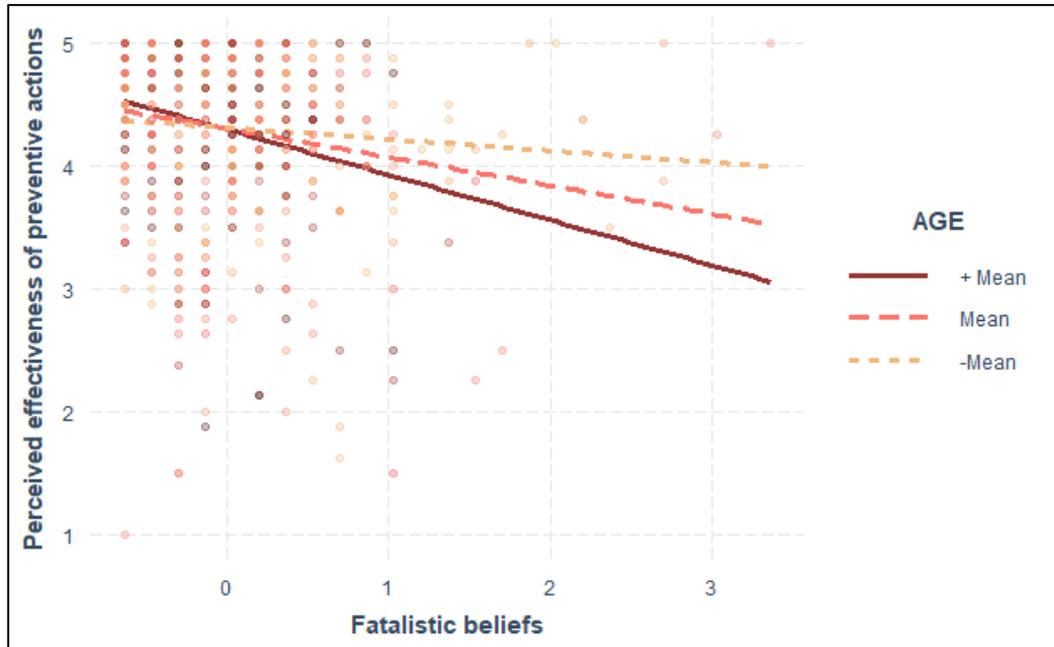


Figure 30: Interaction effect between age and fatalistic beliefs on perceived effectiveness of preventive actions

3.4.1.2. Moderating effect between accident experience and fatalistic beliefs on safety behaviour and on the perception of prevention actions

Interaction effect of accident experience and fatalistic beliefs on safety behaviour

We test the interaction effect between fatalistic beliefs and accident experience on safety behaviour. Our hypothesis **H5** predicts that the relationship between fatalistic beliefs and safety behaviour will be moderated by accident experience. The regression

result shows a non-significant interaction, $b = 0.07$, $R^2 = 0.14$, $t(607) = 94$, 95% CI [-0.08, 0.22], $p = .35$. This result does not confirm our hypothesis **H5** (See figure 31).

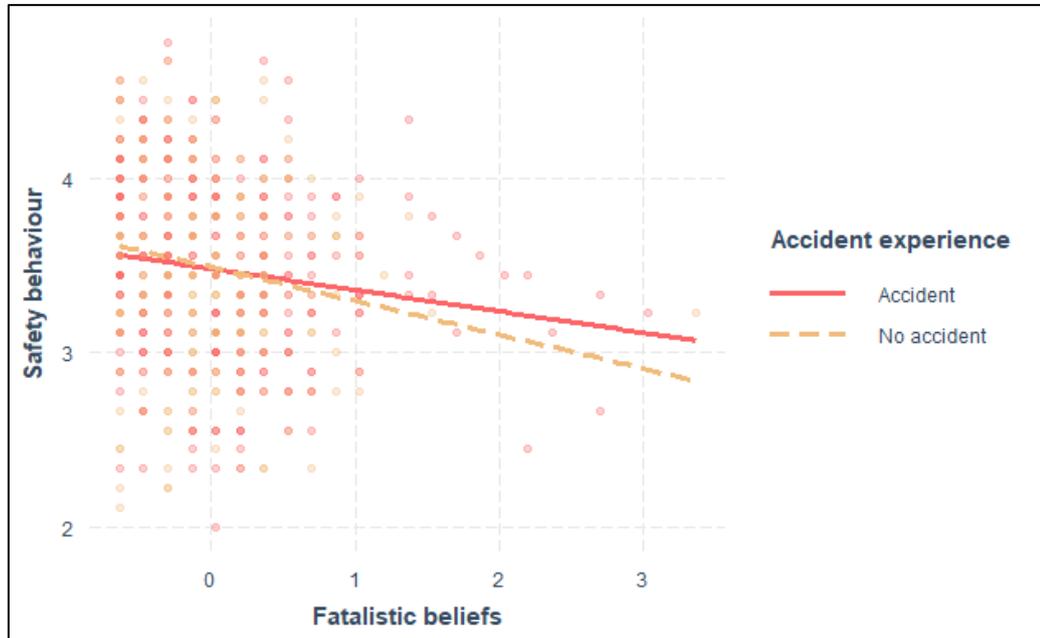


Figure 31: Interaction effect of accident experience and fatalistic beliefs on safety behaviour

Interaction effect of accident experience and fatalistic beliefs on perceived effectiveness of preventive actions

Our Hypothesis **H6** tests the interaction effect between fatalistic beliefs and accident experience on perceived effectiveness of preventive actions. The result of the interaction is not significant, $b = -0.02$, $R^2 = 0.00$, $t(607) = -0.39$, 95% CI [-0.12, 0.08], $p = .69$ (see figure 32). This result does not confirm our prediction **H6**.

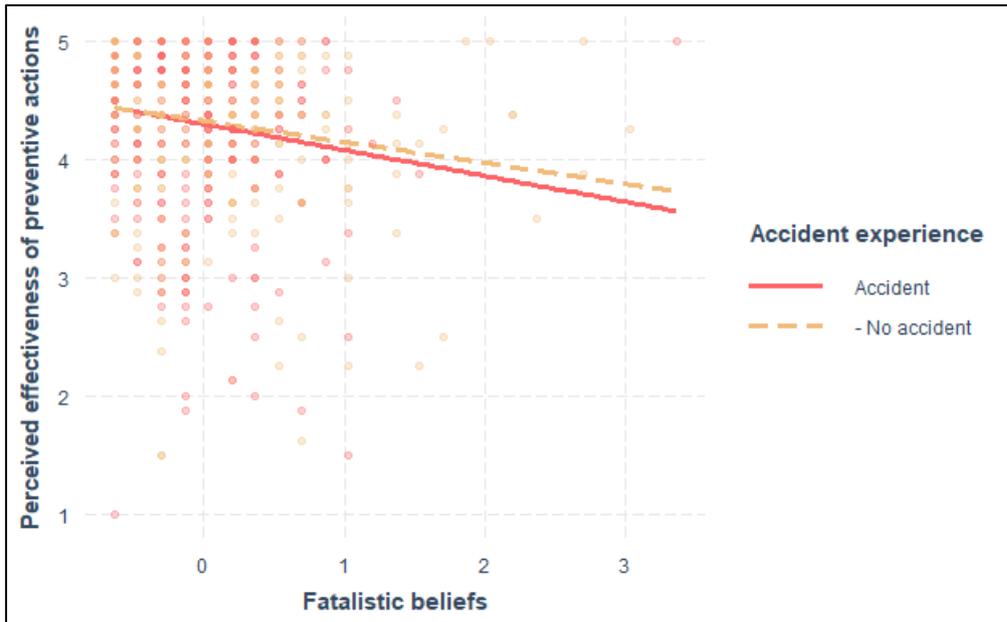


Figure 32: Interaction effect of accident experience and fatalistic beliefs on perceived effectiveness of preventive actions

3.4.2. Impact of control beliefs on safety behaviour and the perception of preventive actions

The results of the regression analysis show a non-significant link between control beliefs and safety behaviour $b = 0.02$, $R^2 = 0.01$, $t(611) = 0.46$, IC 95% [-0.05, 0.08], $p = .64$. Hence, hypothesis **H7** was not confirmed. Moreover, a regression analysis was applied to test the link between control beliefs and the perception of preventive actions. The result show that control beliefs positively and significantly predict perception of preventive actions $b = 0.31$, $R^2 = 0.25$, $t(611) = 8.12$, IC 95% [0.27, 0.43], $p = .001$. This confirms hypothesis **H8** which predicts that a high sense of control over hospital risks will be positively linked with perceiving preventive actions as effective.

3.4.2.1. Interaction effect between age and control beliefs on safety behaviour and on the perception of preventive actions

Moderating effect between age and control beliefs on safety behaviour

We test here the joint effect of control beliefs and age on safety behaviour. The hypothesis **H9** indicates that the relationship between control beliefs and safety behaviour will be moderated by age. The result shows a non-significant interaction, $b = -0.00$, $R^2 = 0.00$, $t(607) = -0.68$, 95% CI $[-0.01, 0.00]$, $p = .49$. Therefore, the hypothesis **H9** is not confirmed (See figure 33).

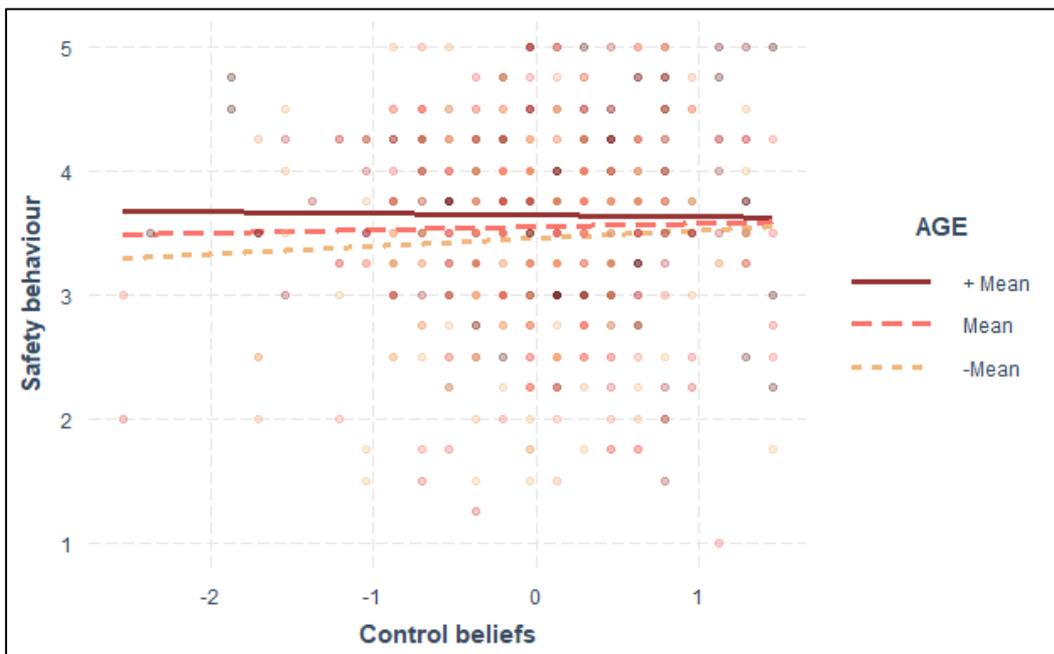


Figure 33: Moderating effect between age and control beliefs on safety behaviour

Moderating effect between age and control beliefs on perceived effectiveness of preventive actions

The interaction between control beliefs and age on perceived effectiveness of preventive actions is non-significant, $b = -0.01$, $R^2 = 0.28$, $t(607) = -1.32$, 95% CI [-0.01, -0.00], $p = .19$. This result does not confirm our hypothesis **H10** that the effect of control beliefs on perceived effectiveness of preventive actions will be moderated by age. Our hypothesis **H10** is therefore not confirmed (see figure 34).



Figure 34: Moderating effect between age and control beliefs on perceived effectiveness of preventive actions

3.4.2.2. Interaction effect between accident experience and control beliefs on safety behaviour and on the perception of preventive actions

Moderating effect between accident experience and control beliefs on safety behaviour

The regression results in figure 35 show a non-significant interaction between control beliefs and accident experience in relation to safety behaviour, $b = -0.08$, $R^2 = 0.00$, $t(607) = -1.23$, 95% CI $[-0.21, 0.05]$, $p = .22$ (see figure 35). This finding does not support our hypothesis **H11**, which suggests that the negative effect of control beliefs on safety behaviour will be moderated by experience of accident.

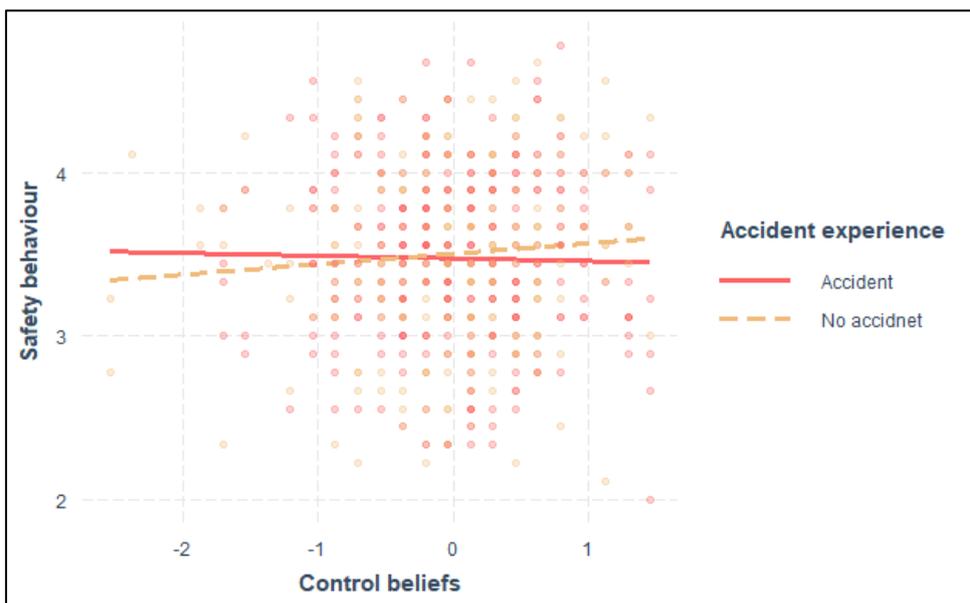


Figure 35: Moderating effect between accident experience and control beliefs on safety behaviour

Moderating effect between accident experience and control beliefs on perceived effectiveness of preventive actions

Furthermore, the results show a non-significant interaction between control beliefs and accident experience in relation to perceived effectiveness of preventive actions, $b = -0.05$, $R^2 = 0.24$, $t(607) = -1.21$, 95% CI $[-0.14, 0.03]$, $p = .23$ (see Figure 36). These findings therefore do not support our hypothesis **H12**, which suggests that the effect of control beliefs on perceived effectiveness of preventive actions will be moderated by accident experience. This do not confirm our assumption **H12**.

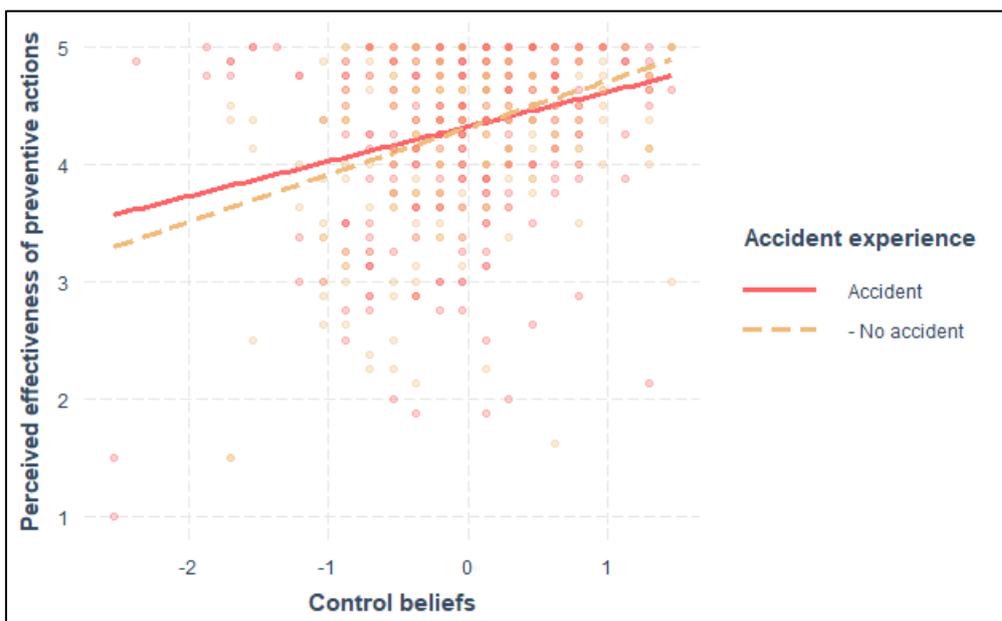


Figure 36: Moderating effect between accident experience and control beliefs on perceived effectiveness of preventive actions

3.4.3. Effect of normative beliefs on safety behaviour and on perception of preventive actions

Our hypothesis **H13** predicts that healthcare workers that have high normative beliefs will adopt more safety behaviour. The regression result show that normative beliefs did not significantly predict safety behaviour $b = 0.05$, $R^2 = 0.02$, $t(611) = 1.16$, IC 95% [-0.01, 0.05], $p = .25$. Therefore, the hypothesis **H13** was not confirmed. The results also show that normative beliefs significantly predict perception of the effectiveness of preventive actions, $b = 0.29$, $R^2 = 0.35$, $t(611) = 7.35$, IC 95% [0.13, 0.22], $p = .001$. This result upholds our hypothesis **H14** that the more workers accept to adhere to the opinion or expectation of important people, the more they will perceive preventive measures as effective. Therefore, **H14** is confirmed.

3.4.3.1. Moderating effect between age and normative beliefs on safety behaviour and on the perceived effectiveness of preventive actions

Joint effect of age and normative beliefs on safety behaviour

The multiple regression analyses indicate that the interaction link between age and normative beliefs on safety behaviour is not significant, $b = -0.00$, $R^2 = 0.00$, $t(607) = -1.16$, 95% CI [-0.01, 0.00], $p = .25$ (see Figure 37). This result did not confirm our hypothesis **H15** which assumes that the effect of normative beliefs on safety behaviour will be moderated by age.

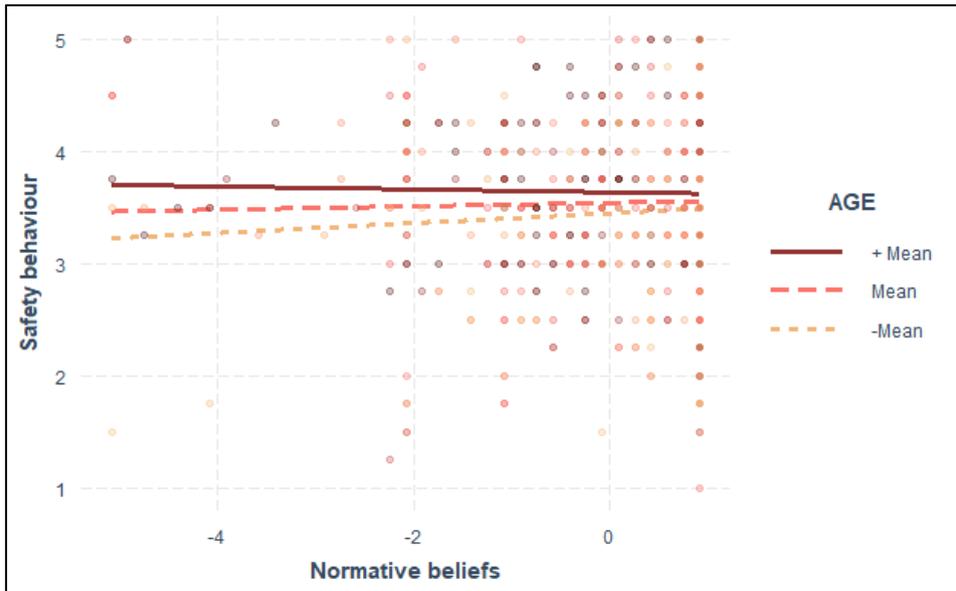


Figure 37: Joint effect of age and normative beliefs on safety behaviour

Joint effect of age and normative beliefs on perceived effectiveness of preventive actions

Furthermore, the result of the regression analysis shows non-significant joint effect of normative beliefs and age on perceived effectiveness of preventive actions, $b = -0.00$, $R^2 = 0.00$, $t(607) = -0.41$, 95% CI $[-0.01, 0.00]$, $p = .68$. This result does not confirm our hypothesis H16 that age will moderate the effect of normative beliefs on perceived effectiveness of preventive actions. Therefore, our hypothesis H16 is not confirmed (see figure 38).

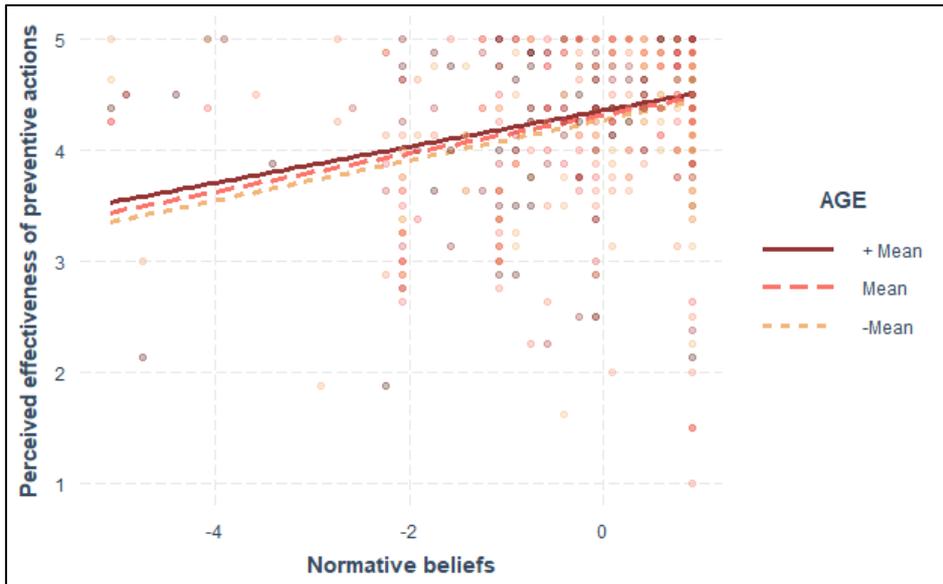


Figure 38: Joint effect of age and normative beliefs on perceived effectiveness of preventive actions

3.4.3.2. Moderating effect between accident experience and normative beliefs on safety behaviour and on the perception of preventive actions

Joint effect of accident experience and normative beliefs on safety behaviour

Our hypothesis H17 predicts that the effect of normative beliefs on safety behaviour will be moderated by accident experience. The results show non-significant interaction effect, $b = 0.03$, $R^2 = 0.00$, $t(607) = .80$, 95% CI [-0.04, 0.09], $p = .42$. Hypothesis H17 is not confirmed (see figure 39).

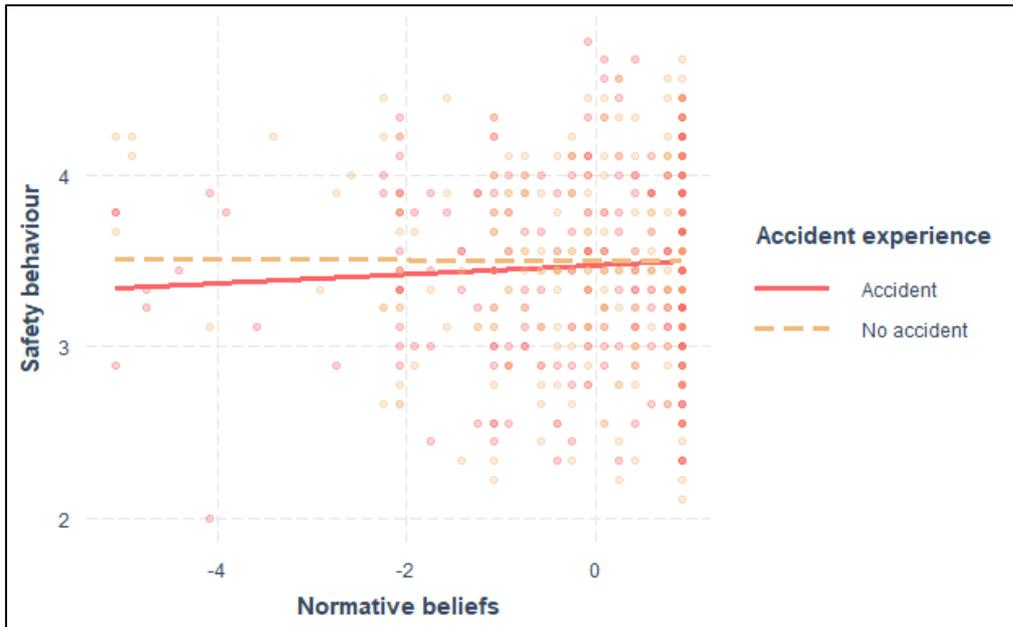


Figure 39: Joint effect of accident experience and normative beliefs on safety behaviour

Joint effect of accident experience and normative beliefs on perceived effectiveness of preventive actions

Multiple regression analyzes indicate that the interaction link between experience of accidents and normative beliefs and safety behaviors is not significant, $b = 0.02$, $R^2 = 0.00$, $t(607) = 0.75$, 95% CI $[-0.03, 0.06]$, $p = .45$. Our hypothesis H18 is not confirmed (See Figure 40).

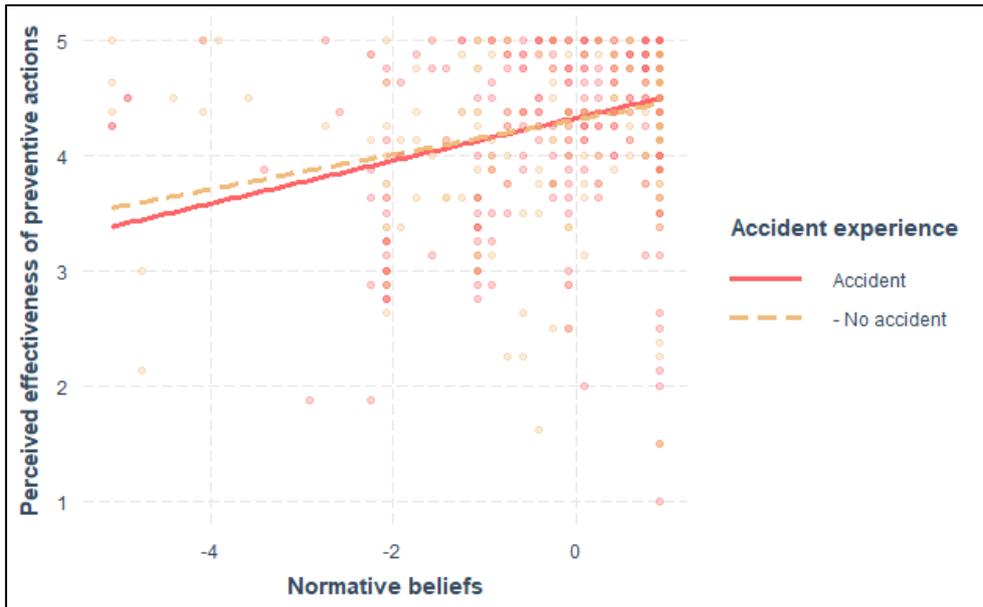


Figure 40: Joint effect of accident experience and normative beliefs on perceived effectiveness of preventive actions

3.4.4. Relationship between perceived effectiveness and safety

behaviour

In order to test the assumption **H19** that perceived effectiveness of preventive measures will be positively related to safety behaviour, we applied a linear regression analysis. The result shows a positive and significant link between healthcare workers perceived effectiveness of preventive actions and safety behaviour $b = 0.12$, $R^2 = 0.04$, $t(611) = 2.87$, IC 95% [0.03, 0.14], $p = .004$. This result is in line with hypothesis (**H19**), indicating that when workers have the conviction that preventive actions are effective, they tend to uphold secure behaviour.

Table 14

Summary of the principal results on the relationship between fatalistic beliefs, control beliefs, normative beliefs, safety behaviour and perceived effectiveness of preventive actions.

Variables	Safety behaviour			Perception of preventive actions		
	<i>b</i>	<i>t</i>	<i>R</i> ²	<i>b</i>	<i>t</i>	<i>R</i> ²
Fatalistic beliefs	-.15***	-3.70	.06	-.16***	-3.81	.02
Fatalistic beliefs X Age	-.01	-1.21	.00	-.02*	-2.41	.01
Fatalistic beliefs X Accident experience	.07	0.94	.14	-.02	-0.39	.00
Control beliefs	.02	0.46	.01	.31***	8.12	0.25
Control beliefs X Age	-.00	-0.68	.00	-.01	-1.32	.28
Control beliefs X Accident experience	-.08	-1.23	.00	-.05	-1.21	.24
Normative beliefs	.05	1.16	.02	.29***	7.35	.35
Normative beliefs X Age	-.00	-0.90	.00	-.00	-0.41	.00
Normative beliefs X Accident experience	.03	-0.80	.00	.02	0.75	.00
Perception of preventive actions	.12**	2.87	.04	-	-	-

Note: * < .05; ** < .01; *** < .001.

4. Discussion

The objective of this chapter is to 1) determine the effect of fatalistic beliefs, control beliefs and normative beliefs on safety behaviour and on perceived effectiveness of preventive actions; 2) to establish the interaction effect between beliefs, age, and accident experience on safety behaviour and on perceived effectiveness of preventive actions. Some of our results are in line with our assumptions and other scientific findings in the literature, while some of the results are contrary to our hypotheses.

Fatalistic beliefs differ according to age, gender, accident experience and professional experience

Firstly, we observed differences in fatalistic beliefs based on age. Younger healthcare workers are more fatalistic than the older ones. This means that as the participants get older, their fatalistic beliefs decrease. This do not agree with available result in the literature on the link between age and fatalism (Mayo et al., 2001). These authors find that older participants were more fatalistic. On the contrary, the older the health workers, the less they accept that accident are uncontrollable and are determined by fate. This may be because of their high level of work experience and high level of education. Younger HCWs are likely to be in their early years of work. Moreover, it may be likely that the more experienced they are, the more they are likely to understand how accidents happen at workplace thereby exhibiting lower fatalism. This requires more studies to understand why younger people believe more that accident is by fate and uncontrollable. Secondly, we found that women are more fatalistic than men which contrasts the results on the link between fatalistic beliefs and gender (Peltzer, 2003; Salazar-Collier, 2021) that men are more fatalistic than women. For female healthcare workers, they believe more that accidents are predetermined and beyond human control.

Thirdly, the link between accident experience and fatalism shows that people who have not experienced accident are more fatalistic than accident victims. This is contrary to the findings of Patwary et al. (2012) and Peltzer and Renner (2003) that a positive correlation exists between work accident experience and fatalistic belief. This means that people who have experienced accidents or are witnesses of accident are more fatalistic. Moreover, among the categories of healthcare workers, their level of fatalism differs. We observed that professional nurses have higher fatalistic beliefs than other group of

healthcare workers. We can recall that this group of HCWs scored least in their study level. We can believe that level of education plays a role in their differences on fatalistic beliefs. Although the analysis on the level of study and fatalistic beliefs was not significant.

Control beliefs differ according to age

Among all the sociodemographic variables that were analysed, age was the only predictor of control beliefs among HCWs. We see from the result that the more health workers advance in age, the more they are likely to believe they have the capacity to manage hospital risks. This result supports the finding of Barber and Strickland-Hughes (2019) that older adult participants who perceived their ability to make and follow new plans in the future also scored higher in their perceived control over their memory. Therefore, it could be explained that when one gets older, they feel they can situations more younger ones.

Normative beliefs vary according to age and gender

Our results show that normative beliefs are more pronounced among younger health care workers. This result is practical because naturally in most Nigerian societies like the south-east zone, younger people tend to look up to older ones for ideas and solution to problematic situations. Therefore, it will not be surprising to see that younger HCWs recognizes more the normative expectations of referent others at workplace than do older health workers. In general, we believe people look up to people who they hold in high esteem and who they think are better equipped mentally than they are. Padmanabhanunni and Gerhardt (2018) study on the link between age and normative acceptance of aggression, found that younger people have higher normative acceptance

of physical aggression than older ones. Additionally, our results show that women have higher normative beliefs than do men. This means that women are more likely to adhere to the behavioural expectation of referent others in their lives than the men.

Safety behaviour vary by age, study level and professional category

Based on the results obtained, it is observed that age influences safety behaviour of healthcare workers at the workplace. Older HCWs were more likely to engage in safety behaviour than younger workers. Siu et al. (2003) recorded a positive relationship between older workers and positive safety attitudes. Their result supports that, older workers are more responsive to safety attitude than younger counterparts. Also, the study by Gyekye and Salminen (2009) is relevant to the outcome of our analysis as they established that the older respondents had more positive perception of work safety. Indeed, this can be explained by older workers exposure and experience considering their length of years at work, may influence their level of knowledge on the need to maintain safety at the workplace.

Additionally, we recorded that study level predicts safety behaviour of HCWs. We established that the higher the HCWs acquire knowledge, the more likely they are to observe safety protocols. Chen et al. (2021) identified that higher level of education is a strong positive influential factor in safety commitment. A further analysis on the group of HCWs that are more likely to engage in safety behaviour, showed that specialist medical practitioners engage more in safety behaviour than other categories of HCWs studied. The specialist medical personnel are the group of HCWs that specializes in peculiar area of medicine such as gynecologists, pediatricians, surgeons, etc. However, in future studies, it will be interesting to understand better the factors that motivates the

specialists' health personnel in getting involved in safety behaviour than other health workers.

Fatalistic beliefs cause healthcare workers to adopt insecure behaviour

The result of our analysis reveals that fatalism predicted unsafe work behaviour. This result agrees with our hypothesis that fatalistic beliefs negatively predict safety behaviour at work. This may be explained on the basis that fatalistic beliefs are marked by the feeling of helplessness whereby an individual feels that accident is bound to happen no matter what one does to avoid it. Markedly, possessing this thought that accident is predetermined and cannot be controlled could lead to neglect of safety precautions and involvement in actions that compromises safety at work (Ngueutsa & Kouabenan, 2017). This result is consistent with work of McIlroy et al. (2020) who established that, fatalistic beliefs negatively affect attitudes and unsafe pedestrian behaviours of road users. In the same line, Patwary et al. (2012) found that most medical waste workers who did not wear personal protective equipment were associated with their fatalistic beliefs. Considering the different categories of healthcare workers, their level of fatalism and safety behaviour, we found that professional nurses who had stronger fatalistic beliefs compared to other category of health workers, had the lowest score for safety behaviour. This strengthens the findings that having a feeling that accident is predetermined is strongly linked with unsafe behaviour.

Fatalistic beliefs negatively influence perceived effectiveness of preventive actions among healthcare workers

The link between fatalism and the perception of preventive actions has not been established in the literature, to the best of our knowledge. Interestingly, the result of our analysis shows that fatalistic beliefs is negatively associated with the perceived effectiveness of preventive actions. Basically, perception of preventive actions is marked by perceived effectiveness of safety measures. Our results reveal that believing accident to be by chance or luck not because of an individual's behaviour, could weaken one's objective judgement about safety behaviour and the effectiveness of safety actions. We should recall that fatalism negatively predicts safety behaviour (MacIlroy et al., 2020). It is understandable, that when the feeling of helplessness dominates the thought that accident is uncontrollable, it could increase the tendency to believe that preventive actions are not effective. Hence, fatalistic beliefs are to be considered a fundamental factor in understanding HCWs perceived effectiveness of preventive actions.

The negative influence between fatalistic beliefs and perceived effectiveness of preventive actions is stronger among older HCWs

Our results show a significant interaction between age, fatalistic beliefs and perceived effectiveness of preventive actions. Particularly, we find that the negative effect of fatalistic beliefs on perceived effectiveness of preventive actions is stronger for older HCWs than for those who are younger. This means that participants who have high fatalistic beliefs and are older, perceive less the effectiveness of preventive actions. We recall that the older an individual, the higher the fatalistic beliefs (Mayo et al., 2001) and fatalism have a negative effect on perceived effectiveness of preventive actions.

Moreover, we can recall that fatalists believe that accidents are predetermined (Ngueutsa & Kouabenan (2017). Therefore, believing that accident that will happen, will happen no matter what one does, can influence one to believe that preventive actions are not effective in preventing accidents that are bound to happen.

Control beliefs positively influence perceived effectiveness of preventive actions

Moreover, there was a positive relationship between control beliefs and the perceptions of preventive actions. That is, healthcare workers who demonstrated a greater trust in their capacity to handle hospital risks, perceived that, preventive actions are effective in dealing with hospital work risks. In a similar study, Vekiri (2010) found significant relationship between students' perceived competence and information communication technology skills. In essence, confidence in the productivity of their ICT skills is being influenced by their perceived behavioural control. The positive link between control beliefs and perceived effectiveness of preventive actions may be influenced by higher level of study. Having a high knowledge can improve expertise and confidence in one's ability to handle risks. This can lead one to believe that preventive actions are effective than for those who have low confidence in their skills and who have low level of education.

Moreover, our results established that control beliefs do not significantly predict safety behaviour. This is contrary to the existing findings that perceived behavioural control is linked with safety behaviour. For example, Milton and Mullan (2012) showed that perceived behavioral control is an excellent way for improving food safety behaviour. Also, Kouabenan et al. (2016) established that perceived ability to carry out hygienic and safety rules during normal work periods is linked with engagement in hygienic and safety behaviours. On the opposite, Ngueutsa (2012) found that perceived ability to cope with

dangerous traffic situations is associated with less-safe behaviour. These discrepancies in the findings on how control beliefs relate with safety behaviour may be explained by other underlying factors. For instance, work condition or individual characteristics could be an influence in the way people perceive their capability and their engagement in safety behaviour. This suggests further studies on the factors that can mediate or moderate the effects of control beliefs on safety behaviour.

Normative beliefs, an element in perception of preventive actions among HCWS

Another interesting result we recorded is the positive effect of normative beliefs on perceived effectiveness of preventive measures. We found that the higher the HCWs possesses normative beliefs, the more they perceive preventive actions as effective. This finding is an added knowledge on normative beliefs and perception of preventive actions. We did not record any significant effect between the two variables. Although the relationship between normative beliefs and safety behaviour is not significant, it shows the direction that the high the HCWs normative beliefs, the more they adopt safety behaviour. This is line with the study of Lin and Roberts (2020); Milton and Mullan (2012) and Mullan and Wong (2009) that the more a person think to do what is recommended, the more the individual embraces safety behaviour. This shows that normative beliefs have a positive link with safety behaviour.

Perceiving the effectiveness of preventive actions encourages adoption of safety behaviour

We found from our analysis that perception of preventive actions has a positive effect on safety behaviour. This suggests that healthcare workers are more likely to be involved in secured behaviour when they perceive that the preventive actions are

apparently suitable in the prevention of hospital work risks. In essence, recognizing the effectiveness or the efficiency of preventive actions, is a source of drive to maintain actions that encourages safety at work. The believe that the safety actions in managing work risk is successful in giving a desired or intended result, is an important factor to be considered in risk and accident management (Vaughan, 1993). Notably, McCool et al. (2009) recorded this effect to show that trust in the effectiveness of the recommended safety activities, successfully inspires positive response in taking precautions. Moreover, the work of Kouabenan et al. (2016) was not different from these findings as they observed that beliefs in the effectiveness of the preventive measures against foodborne infections is an effective way of curtailing risk behaviour and avoiding future occurrence. Furthermore, perceived behavioural control is another factor that can be considered in accident explanations and safety behaviour. Additionally, Bechard et al. (2021) and Jeihooni et al. (2017) find that perceived benefits of safety actions increase the chances of people to engage in positive behaviour.

Conclusion

Fatalistic beliefs are known to promote the thoughts that accidents are by chance and are uncontrollable (Franklin et al., 2007). Precisely, possessing fatalistic beliefs is established as a factor that can compromise involvement or commitment to safety protocols in Nigerian hospitals. Additionally, our findings reveal that fatalistic beliefs negatively influence perceived effectiveness of preventive actions. Also, we find that negative effect of fatalistic beliefs on perceived effectiveness of preventive actions is stronger when workers are older. To the best of our knowledge, this is the first study to explore the link between fatalistic beliefs and perception of preventive actions. Therefore,

our results are original contribution to studies on factors that influences perceived effectiveness of preventive actions.

The negative influence of fatalistic beliefs on safety behaviour and on perceived effectiveness of preventive actions suggests the need to design programs that targets attitude change which aids changes in beliefs that compromises safety behaviour, thoughts, and feelings. In this case, fatalism should be the target belief for change, when designing these attitudes change programs. Attitudes can be built by persistently providing information that supports more developed knowledge structure. This produces high-effort cognitive processes that builds attitude strength (Petty et al., 2003). These programs can be achieved through constant training sessions, workshops and campaigns. The outline of the training content can include knowledge that sensitizes people on the negative effect of the thought that accidents are not controllable and the need to follow safety rules. This will aim at reducing fatalistic beliefs of HCWs as it interferes with safety behaviour.

Additionally, we noted from the results of this study that education is a factor in fatalism and safety behaviour. We established that the category of healthcare workers who have low level of study possesses more fatalistic beliefs, but we did not establish any significant relationship between causal explanations and level of education. Kouabenan (2013) mentioned that fatalism and causal explanations can be dependent on the level of education. Therefore, there is need for more research work to understand how level of study is linked with fatalistic beliefs and causal explanations. Notwithstanding, workers should be encouraged to advance in their education or training on contemporary issues in their profession. This should be the responsibility of the government by providing education grants and training incentives to achieve their goal. Additionally, HCWs should

be encouraged to keep updating their knowledge through training and retraining. Different forms of teachings and trainings can be organized based on workers need and level of education to suit their need. For instance, we saw from the analysis that professional nurses scored low in their level of education. This finding should be taken seriously by health institutions to ensure that this group of HCWs are supported to advance in their education and training to improve their knowledge of their profession.

Chapter 8: Effect of naive explanations of accident on safety behaviour and on the perception of prevention actions

Introduction

Investigating accident situations at work through the analysis of naive causal explanations of accidents (Kouabenan, 1999) is progressively being explored by researchers in accident analysis and prevention. Several studies (Boua, 2021; Gletty, 2017; Gyekye, 2006; Kouabenan, 1999, 2009; Nguetsa, 2012; Niza et al., 2008) have been carried out to understand how individuals attribute causes to the accidents they face at work or on the road and how these causal explanations impact on their behaviour towards risks. Certainly, causal explanations are essential for assessing risks and accidents in the organizations because they establish the activities of organizations in accident prevention and management to minimize or avoid reoccurrence (Gyekye, 2010). Thus, causal explanations become a useful tool in understanding accident situations and individual's behaviour towards risks (Gyekye, 2010; Kouabenan, 1999). Besides, causal explanations of accident can be an element in perceived effectiveness of preventive actions among workers. Perceived effectiveness of hospital accident preventive measures implies the extent to which HCWs believes that safety actions or work policies are efficient in maintaining total safety in hospitals (Rosenstock, 1974). However, the role of causal explanations on the perceived effectiveness of preventive actions is lacking in the literature. Consequently, it is important to understand how causal explanation influences individual perceived effectiveness of preventive action.

Moreover, according to Kouabenan (1999) causal explanations provided by individuals can be influenced by their psycho-social makeup such as accident experience,

age, gender, level of study, etc. Therefore, the objective of this chapter is to 1) analyze the effect of causal explanations on individuals' behaviour towards risk; 2) test the influence of causal explanations on the perception of preventive actions; 3) test the combined effect of age and naive causal explanations of accidents on safety behavior and on the perception of preventive actions; and 4) test the interacting role of accident experience on the effect of naive causal explanations in regards to safety behavior of HCWs and perceived effectiveness of preventive actions.

1. Problems and hypotheses

Hospital work risks and accident has been a challenge facing the health industry in Nigeria, which calls for an improved and effective preventive approach. A report by the Occupational Safety and Health Administration (OSHA, 2013) on hospital worker's safety, shows that hospital has the highest days away from work resulting from non-fatal accidents. These work incidences negatively impact on workers' health, their emotional and psychological wellbeing, economic and organizational output. Kouabenan and Alladoum (1997) emphasized that accident consequences are beyond physical and psychological effect on the health of workers to encompass losses for the organizations, the worker, his family, and the society at large. In this regard, the process of naive causal explanations of accidents takes an important place as an indispensable and preliminary element in accident analysis and preventive actions (Gyekye, 2010; Kouabenan, 1999, 2008). This entails that, naive explanations of accident are useful for unravelling causal factors responsible for hospital work accidents and the reason preventive measures may not be sufficient in improving hospital accident situation.

The model of naive explanations of accident by Kouabenan (1999) unravels the knowledge that naive explanations of accident are subjective expression of accident causes by people who are confronted with the analysis of an accident, whether they are laymen (employees) or experts. Unfortunately, workers attribution of causes about accidents they face are mostly neglected in risk and accident analysis and safety management. This may lead to their unresponsiveness towards preventive measures, owing to the differences in opinion between non-professionals and professionals on accident causes (Fiorino, 1989; Flynn et al., 1993). Therefore, naive causal explanations of accident by non-experts becomes vital in accident management, as their knowledge about accident causal factors can improve the outcome of risk and accident analysis. In addition, employees' inclusion in accident analysis and policy formulations can improve their involvement in preventive activities as the accident preventive policy provided, will take into consideration what they perceive to be the cause of accidents. For instance, studies have established that explanations of accident by internal factors encourages involvement in safety practice (Ngueutsa, 2012; Rusch et al., 2003).

Basically, Rusch et al. (2003) observed that when workers accept their personal responsibility in work accidents, they are likely to regain courage and face their work than those who attribute accident causes to external factors. Moreover, Ngueutsa (2012) study with 525 road users in Cameroun found that respondents who explain road accidents by dispositional factors, tend to get involved in safety actions than those who give situational causes. This indicates that when individuals explain accident by internal factors, they most likely indulge in safety behaviour. Thus, we will assume that HCWs who provide more internal than external factors to explain hospital accidents will engage in safe behaviour (**H20**).

Another point of attention in this study is to establish the relationship between causal explanations and perception of preventive actions. According to the study by Mbaye et al. (2013), perceiving the effectiveness of experienced based analysis is positively related with internal explanation of accident. Following this reasoning, we propose that internal causal explanations will positively predict perception of preventive actions (**H21**).

Furthermore, research has shown that individual characteristics (age, gender, professional status, accident experience etc.) constitutes variations in causal explanations (Barber & Strickland-Hughes, 2019; Kouabenan, 1999; Salazar-Collier et al., 2021; Taylor & Kleinke, 1992;). Example, Shaw and McMartin (1977) and Taylor and Kleinke (1992) found significant differences in causal explanations among men and women. They established that women tend to attribute more accident causes to dispositional factors than men. To establish the interaction effect of individual attributes on the link between causal explanations and safety behaviour and the perception of preventive measures, our study will focus on age and the accident experience of HCWs.

Age is an important factor as an element of variations in causal attribution. The direction of the effect of age on causal explanation varies. A study by Gletty (2017) on avalanche show that older respondents were more associated with providing more internal factors in explaining accident of victims than do the younger ones. Conversely, other findings recorded that older people are likely to explain accidents more by external factors. For instance, a review on causal explanations of organizational accident by Gyekye (2010) show that older employees explain accidents more by situational factors than their younger counterparts who explain accident more by dispositional factors. Likewise, older supervisors tend to provide more external and unexpected causes of

accident compared to younger supervisors that provides more internal causes in explaining work accidents. In line with these findings, Niza et al. (2008) found that older and senior workers explain accidents more by external factors than junior and younger workers. We recall that studies (Goncalves et al., 2008; Kouabenan, 2013), established that external explanation of accident leads to insecure behaviour. On this account, we would anticipate that behaviour will be less safe when HCWs give more external than internal causal explanation and are older (**H22**). Additionally, we will predict that the older the HCWs, the more they give external explanation for accident and the less they perceive the effectiveness of preventive actions (**H23**). Apart from age, studies have shown that accident experience can influence naive causal explanations of accidents.

The role of accident experience on causal explanation of accidents is mostly divergent. Kouabenan (2002) found no significant relationship between the causal explanations of accidents given by victims and non-victims. He notes that being a victim of an accident does not influence one's representations of risk and accident explanation rather the individual's attitude of being cautious and the effort to avoid accidents in the future (Kouabenan, 1999). In the same direction, the result of the study by Ngueutsa (2012) shows no significant interaction between causal explanation and accident experience which is contrary to the speculations that accident experience will reinforce external causal explanation. Nevertheless, Gonçalves et al. (2008) found that accident experience significantly correlates with external causal explanations and unsafe behavior but negatively correlates with internal explanations. This shows that being a victim of an accident can inspire one to give more causal explanations that relates to factors external to an individual. These authors equally found that external causal explanation is intensified with increased number of accidents a victim experience. The study of the

relationship between experience of work accidents and workers causal explanation by Niza et al. (2008) reveals that victims attribute more causes to external uncontrollable factors and to factors relating to the organization. In the same line, Stewart (2005) recorded that accident victims tend to attribute responsibility to other drivers more than their own and to provide more external explanations like the state of the road or weather conditions. Contrary to these findings, Gletty (2017) study on the relationship between avalanche accidents off-piste and causal explanations reveal that avalanche accident victims explain accidents more by internal causes (lack of knowledge and training) compared to non-victims of avalanche accidents. Nonetheless, accident experience has been mostly speculated to invoke external explanation which incites insecure behavior. On this note, we will speculate that HCWs will give more external causal explanation and adopt less safe behaviour when they have experienced accident (**H24**). This means that for HCWs who have experienced accident and explain accident by external causes, behaviour will be less safe than for those with no accident experience. Furthermore, we will presume that health workers will explain accident more by external factors and perceive less the effectiveness of the preventive actions when they are victims of accident than non-victims (**H25**).

2. Methodology

Participants

A sample of 611 health workers which includes doctors, nurses and laboratory scientists/technologists were involved in the study. The healthcare workers were recruited from public and private hospitals in the metropolis of three states in the south-east geopolitical zone of Nigeria: Anambra, Abia, and Ebonyi. The methodology applied in

this chapter is the same as the one outlined in chapter 7. This employs the same scale for measuring safety behaviour and perception of preventive actions. To avoid inconsequential repetition, we focus on the description and validation of the scales of the measurement of naive explanations of hospital work accident.

2.1. Material

For analyzing the principal hypotheses, we used a scale measuring the naive explanations of accident built by us (description below) and the safety behaviour scale, and the perception of preventive actions scale which were used in our studies in chapter 7.

2.2. Measurement of naive explanations of hospital accidents

The scale for measuring naive causal explanation of hospital work accident measures the possible factors that can explain accident encountered by Nigerian healthcare workers in the health sector. The scale is constituted of 9 items from a list of possible causes of accidents and diseases in the Nigerian hospital as provided by healthcare workers from the exploratory study and supported with existing literature Kouabenan (1999, 2002). The development of the scale was based on the model of naive causal explanation of accident by Kouabenan (1999). It constitutes 2 major dimensions which are the internal and external causal explanations. Examples of the items in the internal causal explanation dimensions are: *“failure to give enough attention to avoiding harm (carelessness); Improper safety practice and Lack of training*. The external causal explanations are represented with items that includes *“emergency situations, attack from patients and relatives, lack of safety equipment”* etc. The scale has instruction that

requires the respondents to estimate the level of importance of each item in hospital work accident (1 – not important to 5 – very important).

2.3. Procedure

The procedure for data collection used in this chapter is the same as that explained in chapter 7. We will focus on the procedure for the validation of the scale of naive explanation which follows the process of confirmatory factor analysis (CFA). Firstly, the reliability test was carried out to determine the internal validity using the alpha coefficient value. This is followed by preliminary test of the scale of naive causal explanations of hospital accidents with CFA. The confirmatory factor analysis was employed to validate the scale of naive causal explanations because it did not meet the criteria for exploratory factor analysis (Flora & Curran, 2004). Following the confirmatory factor analysis, all items of the scale were retained as they are based on the model of naive causal explanation. The scale contains 9 items measuring two subscales of the internal (6 items) and external explanations (3 items).

3. Results

3.1. Procedure for analyzing the results

Data analysis is carried out with SPSS software V.25 and R version 4.1.2. Firstly, we verify the validity of the scale measuring naive causal explanations of hospital work accidents. Cronbach's alpha coefficient test is used to check the internal consistency of the scale and subscales. Secondly, descriptive analysis of the items of the scale is carried out to show the mean and the standard deviation, followed by the correlation analysis between naive causal explanations of hospital accidents, perception of preventive actions

and safety behaviour. Thirdly, we present the results of the differences in naive causal explanations of hospital accidents according to sociodemographic variables. Finally, the results of the principal hypotheses were presented. The hypotheses of this chapter were tested with an internality score for naive causal explanations of accident. To calculate the internality score, we find the difference between the mean score of internal explanation and the external explanation. A positive internality score indicates HCWs who give more internal explanations and a negative internality score indicates HCWs who give more external causes to explain hospital accidents. Furthermore, multiple regression analysis is applied to test the direct relationship between causal explanations and perceived effectiveness of preventive measures and safety behaviour. The perceived effectiveness of preventive actions and safety behaviour were introduced as the dependent variables while the causal explanations were introduced as the independent variables. Moreover, the interaction analysis between age and accident experience on the effect of causal explanations on safety behaviour and perception of preventive actions, were carried out with multiple regression. We note that before carrying out the interaction analysis, the predictor variables (age and accident experience) were first centered to reduce any collinearity effect (Shieh, 2011) while the sociodemographic were introduced as control variables.

3.2. Preliminary data analysis

This section presents the validation of the scales for naive causal explanations of hospital work accidents. The result of the confirmatory factor analysis is presented in the following subheading with the alpha coefficient value as determinant of the scale internal validity. Basically, CFA models are mostly used for data conditions that do not attain the

normal theory requirements for valid Maximum Likelihood estimation (Flora & Curran, 2004). Additionally, it establishes if a data fit a hypothesized measurement model. Therefore, a CFA test will be employed to confirm models fit indices of the naive explanations of hospital accident scale. Moreover, the hypothesized model of the naive explanation is based on an existing theory and on previous analytic research of Kouabenan (1999).

Conditions for verification of confirmatory factor analysis

To assess the goodness of fit of a model in CFA, certain criteria are considered. According to Hu and Bentler (1999), goodness of fit criteria for assessing a model are fit indexes that can be applied to measure the degree of fit in a continuous data. Based on the recommended sample size for a satisfactory statistical power in factor analysis, Mundfrom et al. (2005) suggests a sample size of 3 to 20 times the number of variables or a sample size between 100 to 1000. Using 611 participants in this study meets the criterion for sample size in CFA.

Furthermore, maximum likelihood (ML) estimation method is used to test observed variables that supports a continuous and multivariate normal distribution (Li, 2016). Primarily, ML method is used for a large data that follows multivariate normality distribution. In a case where the observed data violates the condition of a multivariate normality, robust maximum likelihood (RML) will be applied (Li, 2016; Gana & Broc, 2018). To establish whether a data meets the multivariate normality, Mardia test (1970) is applied. A significant outcome of the Mardia test, shows a deviation of multivariate normality of the data. In this case, robust maximum likelihood will be applied. Moreover, in CFA, fit indices are grouped into local and global fit index (Kline, 2005). According to Hooper et al. (2008), a global index is divided into 3, namely absolute, incremental,

and parsimonious fit indices. Absolute fit index is used to evaluate a theoretical model on the observed data (Alavi et al., 2020). It also assesses the general model fit of an observed data against a theoretical model. The fit indexes for assessing a model goodness of fit according to Hu and Bentler (1999) are: Chi-square and Chi-square degree of freedom, Tucker-Lewis Index (TLI; Tucker & Lewis, 1973), the Comparative Fit Index (CFI; Bentler, 1990), Root Mean Square Error of Approximation (RMSEA; Steiger & Lind, 1980; Browne & Cudeck, 1993) and the Standardized Root Mean Square Residual (SRMR). The recommended values for a good fit indexes of a continuous data are described as follows: the **Chi-square** statistic with ML estimates the fit between the hypothesized model and the observed data. Chi-square is applied as absolute fit index and a better model is considered by a higher P-value >5 (Alavi et al., 2020) with a relative Chi-square/degree of freedom between the value < 2 to < 5 is considered satisfactory. Nevertheless, Alavi et al. (2020) noted that Chi-square significance can be affected by a bigger sample size which makes it unreliable. Therefore, other goodness fit indexes are considered in combination with chi-square to estimate a model fit indexes (TLI, CFI, RMSEA, SRMR). **TLI** (Tucker Lewis Index) and **CFI** (Comparative Fit Index) value > 0.9 are considered a satisfactory fit. An **RMSEA** value <0.05 indicates a good fit and RMSEA value between <0.05 to <0.08 is considered an acceptable fit (Hair et al., 2010; Awang, 2012), while values 0.08 and 0.10 is considered a poor fit. In addition, an **SRMR** value ≤ 0.08 shows a good fit and 0 indicates a perfect adjustment.

3.2.1. Validation of the scale of naive explanation of accidents

The scale measuring naive explanation of hospital accidents is made up of 9 items. It comprises of two dimensions that measures the internal (6 items) and external (3 items) causal explanations. The overall scale has a high satisfactory global alpha coefficient (α

= .87). The dimension related to internal causes has a satisfactory reliability index ($\alpha = .82$), while the dimension of the external causes has a satisfactory reliability index of ($\alpha = .75$). To run the CFA, we first carry out a Mardia test to establish the multivariate normality. The Mardia test with maximum likelihood shows a positive value (31.18, $P = < .001$) indicating a non-multivariate normality. This Mardia value suggests the application of the robust maximum likelihood (RML) for the CFA fit indices (see Annex 14, p. 390).

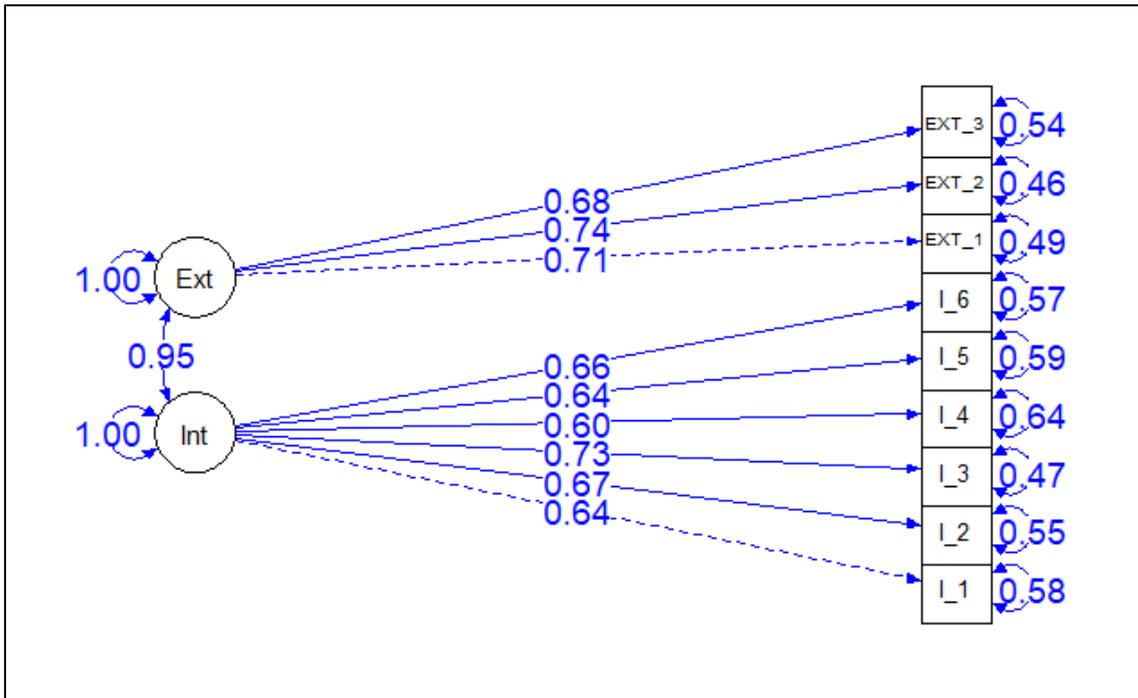
Table 15

CFA summary of models fit indices of the scale for the naive explanations of accident

Model	Indices adjustment							
	χ^2_{robust}	df	P-value	χ^2/df	SRMR	robust CFI	robust TLI	robust RMSEA (confidence interval)
Two dimensions	118.4	26	.001	4.5	.05	0.934	0.908	0.076 (.065, .088)

Note: χ^2 : Chi-Square, df: degree of freedom, SRMR: Standardized Root Mean-Square Residual; CFI: Comparative Fit Index; TLI: Tucker-Lewis Index; RMSEA: Root Mean Error of Approximation

The CFA results in table 16 show a significant Chi-square, $\chi^2(26, n=611) = 118.4$, $p = .001$. This does not conform with the global fit index of our model. However, the relative Chi-square ($\chi^2/df = 4.5$) is acceptable. The CFI value 0.934 indicates a good fit and TLI value 0.908 suggests a good fit. The RMSEA value of 0.076 suggests an acceptable fit index. Additionally, the SRMR value of 0.05 is acceptable and suggests a good fit. Furthermore, in figure 41, the standardized coefficient of the items of the latent variables obtained positive loadings greater than .40 which are acceptable value to represent a factor. Additionally, the correlation between the two factors is significant with $r = 0.95$ (see figure 41).



Notes: EXT= causes external to HCWs; INT= causes internal to HCWs; Items related to internal explanation are I_1, I_2, I_3, etc. while items related to external causal explanation are EXT_1, EXT_2 and EXT_3.

Figure 41 Multidimensional measurement model of the scale of naive causal explanations hospital work accidents.

3.3. Descriptive analyses of the data

A descriptive analysis of the scale for naive explanation of accident was first carried out to explain the data for each subcategory of the scale and to explain the correlation between the subscales of the causal explanations, perceived effectiveness of preventive actions and safety behaviour. The correlation analysis indicates the mean and the standard deviation. The correlation also shows the level of significance of the relationship between the variables of study. The result of the analysis on the relationship between causal explanations and the sociodemographic is stated in subsequent paragraph.

3.3.1. Descriptive analyses of the results of the naive explanation of hospital accident scale

Table 16 highlights the result of the descriptive analysis for causal explanations of hospital accidents. For causes external to the hospital staff, we note that causes related to emergency situations is mostly cited by the respondents to explain external hospital work accident causes (M = 4.18; SD = .96). This is followed by causes related to attacks from patients and relatives (M = 4.04; SD = 1.01), and lack of safety equipment (M= 4.07; SD = 1.10). When considering causes internal to health workers, we see that improper safety practice which simply means inability to follow safety protocols, is mostly cited by HCWs to explain causes of accident that relates to an individual (M = 3.98; SD = 1.04) followed by the cause related to failure to give enough attention to avoiding harm translated as carelessness (M = 3.90; SD = 1.01) and lack of training (M = 3.98; SD = .94). HCWs attach less importance to the internal causes related to conflict among HCWs (M = 3.45; SD = 1.29).

Table 16

Descriptive statistics of items measuring causal explanation of hospital accidents

	Items	Mean	Std. D
Causes external to HCWs	Emergency situations	4.18	.96
	Attack from patients and relatives	4.04	1.01
	Lack of safety equipment	4.07	1.10
Causes internal to HCWs	Improper safety practice	3.98	1.04
	Failure to give enough attention to avoiding harm (carelessness)	3.90	1.01
	Lack of training	3.98	.94
	Lack of organization	3.80	1.07
	Tiredness of the worker	3.69	1.04
	Conflict among health workers	3.45	1.29

3.3.2. Relationship between naive explanations of accident, perception of preventive actions and safety behaviour scales

The correlational results in table 17 show that the internality score of naive causal explanation of accident has a negative significant relationship with perceived effectiveness of preventive actions ($r = -.08, p = .05$). This means that the more HCWs explain accident by external factors, the less they perceive the effectiveness of preventive actions. There was no significant relationship between the naive causal explanation of accident and safety behaviour ($r = .01, p = .77$).

Table 17

Descriptive statistics and inter-correlational analysis of internality score, perception of preventive actions and safety behaviour

Variables	M	SD	1	2	3
Internality score	-.32	.59	1		
Perceived effectiveness of preventive actions	4.31	.72	-.08*	1	
Safety behaviour	3.49	.52	.02	.12*	1

PPA: perception of preventive actions

* $< .05$; ** $< .01$

3.3.3. Variability of naive causal explanations of accidents according to socio-demographic variables

We performed multiple regression analysis to verify if naive causal explanations, vary according to sociodemographic variables. Before applying linear regression where applicable with gender, we first recoded gender to represent male as 1 and female as -1. Therefore, a negative beta coefficient represents female while a positive beta coefficient represents men. Using the linear regression, gender was considered as the independent

variable while the predicted variables were the dimensions of naive explanation. The sociodemographic variables that were tested across the variables were age, gender, accident experience, professional category, level of education and the severity of accident. The regression analysis shows no significant relationship between causal explanations, gender, age, accident experience, level of education, professional category and severity of accident.

3.4. Testing of hypotheses

This section presents the principal results of the hypothesis of the study. We first carry out the analysis on the link between causal explanations of accident on safety behaviour and on perceived effectiveness of preventive actions. These analyses are followed by the interaction of the link between age, accident experience and causal explanations on safety behaviour and on the perceived effectiveness of preventive actions.

3.4.1. Effect of naive explanation of accident on safety behaviour and on the perception of preventive actions

Role of causal explanations on safety behaviours

The regression analysis shows non-significant relationship between causal explanations and safety behavior (H20) $b = 0.01$, $R^2 = 0.01$, $t(611) = 0.15$, 95% CI [-0.06, 0.07], $p = .88$. Our hypothesis **H20** is not confirmed.

Link between causal explanation and perceived effectiveness of preventive actions

The regression analysis shows that the internality score of the naive causal explanation of hospital work accident is negatively related with perceived effectiveness of preventive actions $b = -0.08$, $R^2 = 0.03$, $t(611) = -2.04$, CI 95% [-0.18, 0.00], $p = .04$. This indicates that when healthcare workers provide external causal explanations to hospital work accidents, they tend to perceive less the effectiveness of preventive actions. This result is contrary to our hypothesis **H21** that internal causal explanation will positively predict perceived effectiveness of preventive actions. Rather we found the opposite which means that the more health workers explain accident by external factors, the less they perceive the effectiveness of preventive actions.

3.4.2. Moderating effect between age and naive explanations of hospital accidents on safety behaviour and on the perceived effectiveness of preventive actions

Interaction effect of age and causal explanation on safety behaviour

We test the hypothesis **H22** that behaviour will be less safe when HCWs explain accident by external factors and are older. The outcome of the regression analysis on the interaction between age and external causal explanation on safety behaviour is not significant, $b = -0.01$, $R^2 = 0.00$, $t(607) = -1.54$, CI 95% [-0.01, 0.00], $p = .12$. Although the regression slope is not significant, it does not go in the direction of our hypothesis **H22**, that the more HCWs explain accident by external than internal factors, the less they adopt safety behaviour when they are older. The regression slope in Figure 41 show that behaviours are likely to be safer for younger HCWs when they provide internal causal explanations to hospital accidents, compared to older HCWs.

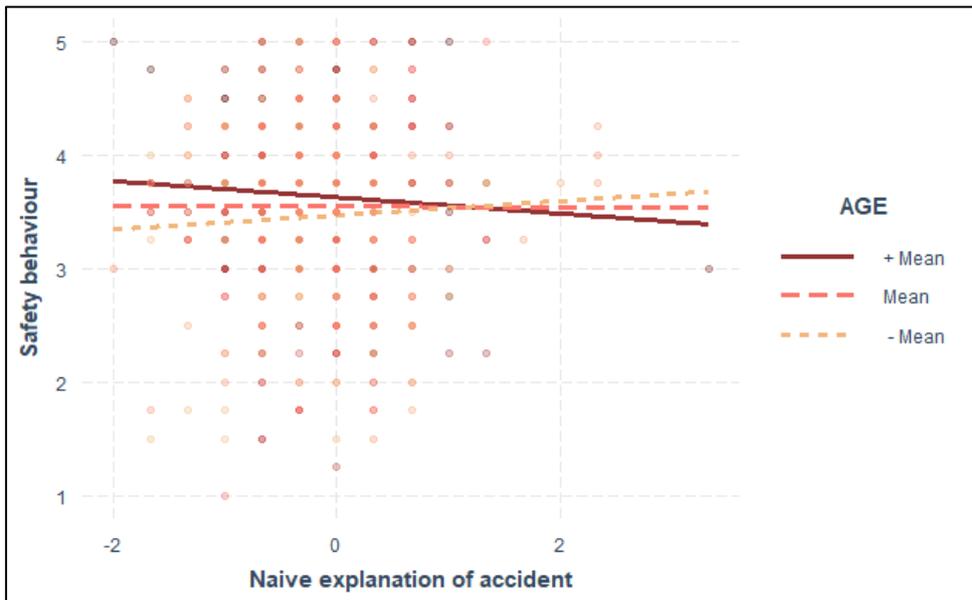


Figure 42 interaction effect of age and causal explanation on safety behaviour

Interaction effect of age and causal explanation on perceived effectiveness of preventive actions

The results in Figure 42 demonstrates the interaction link between age and naive causal explanation in relation to perceived effectiveness of preventive actions. Our hypothesis **H23** presume that health workers will have low perceived effectiveness of preventive actions when they give external causal explanations to hospital accidents and when they are older. The Regression analyses show a trend significant interaction, $b = -0.01$, $R^2 = 0.57$, $t(607) = -1.88$, 95% CI $[-0.02, 0.00]$, $p = .06$. Contrary to **H23**, the interaction slope in figure 42 indicate that the more healthcare workers give internal causal explanations the more they perceive the effectiveness of preventive actions when they are younger than the older ones whose perceived effectiveness of preventive actions does not depend on their causal explanation of accident.

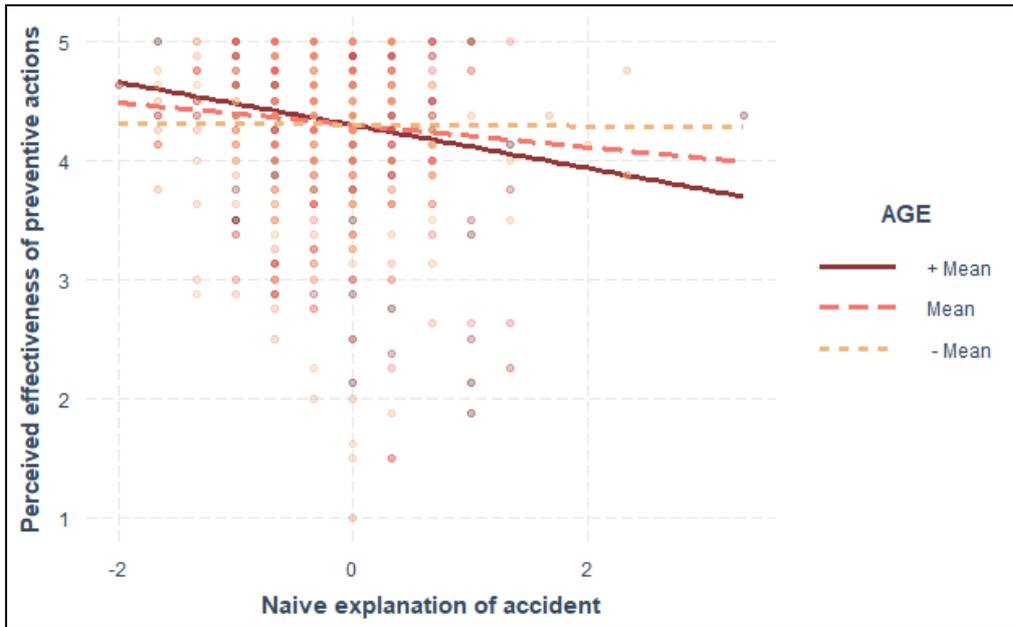


Figure 43 interaction effect of age and causal explanation on perceived effectiveness of preventive actions

3.4.3. Moderating effect between accident experience and naive explanations of hospital accidents on safety behaviour and on the perceived effectiveness of preventive actions

Interaction effect of accident experience and causal explanation on safety behaviour

Our hypothesis **H24** suggests that causal explanation will be more external and safety behaviour less secured when HCWs have experienced accident than when they had never experienced one. The results reveal a non-significant interaction between accident experience and naive causal explanations of hospital accident with respect to safety behaviors $b = 0.07$, $R^2 = 0.38$, $t(607) = 1.52$, 95% CI $[-0.02, 0.17]$, $p = .13$. Our hypothesis **H24** is not confirmed.

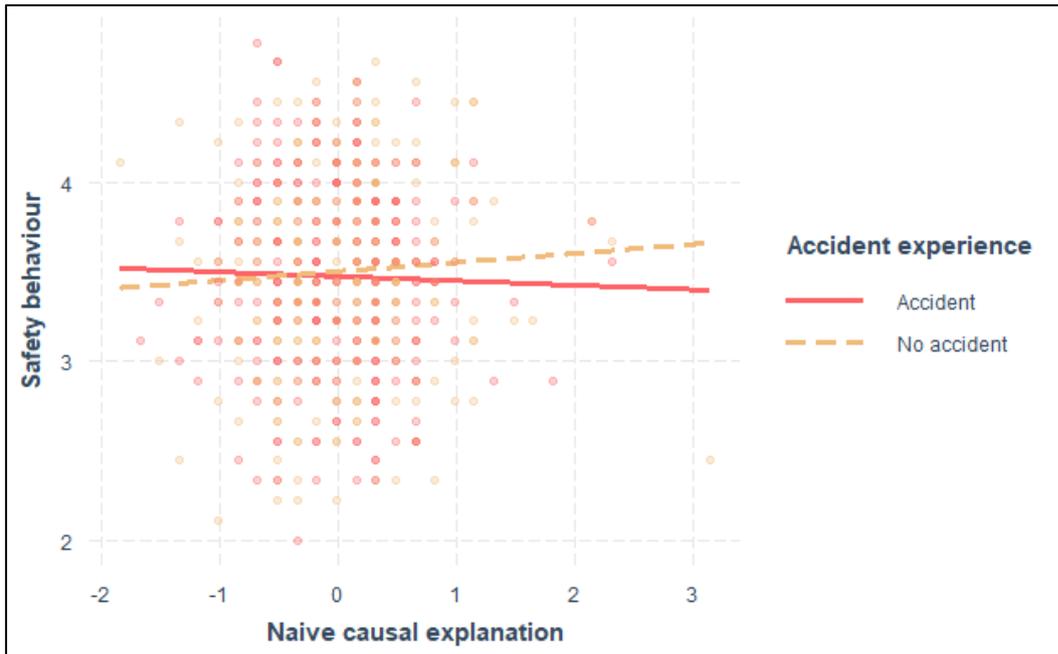


Figure 44 : interaction effect of accident experience and causal explanation on safety behaviour

Interaction effect of accident experience and causal explanation on perception of preventive actions

Our hypothesis **H25** presumes that the negative effect of external causal explanation on perceived effectiveness of preventive actions will be stronger when HCWs had experienced accident. This means that the negative relationship between external causal explanation and perceived effectiveness of preventive actions will be stronger when HCWs have experienced accident than when they have no accident experience. As we can note from Figure 44, the interaction slope of the link between causal explanation and accident experience on perceived effectiveness of preventive actions is not significant, $b = 0.04$, $R^2 = 0.11$, $t(607) = 0.81$, 95% CI [-0.05, 0.13], $p = .42$.

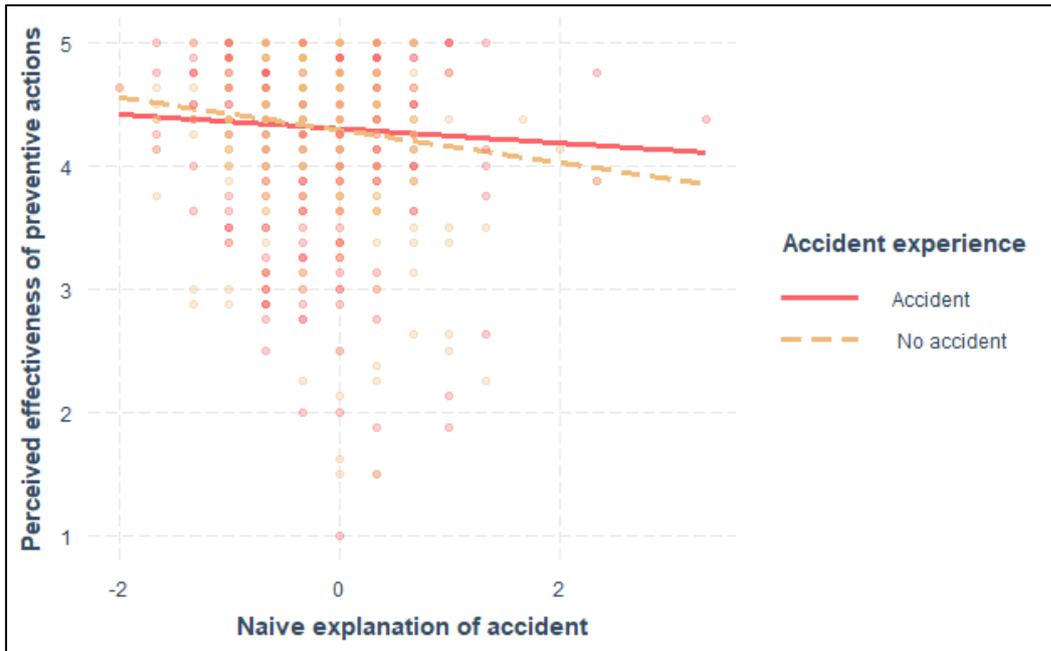


Figure 45: interaction effect of accident experience and causal explanation on the perception of preventive actions

Table 18

Summary of the principal results on the relationship between naive causal explanation and safety behaviour and the link between naïve causal explanation and the perception of preventive actions

Variables	Safety behaviour			Perception of preventive actions		
	<i>B</i>	<i>t</i>	<i>R</i> ²	<i>b</i>	<i>t</i>	<i>R</i> ²
Internality score	.01	0.15	.01	-.08*	-2.04	.03
Internality score X AGE	-.01	-1.54	.00	-.01*	-1.88	.57
Internality score X Accident experience	-.07	-1.04	.00	.04	0.81	.11

Note: **p*<.05, * trend,

4. Discussion

The objective of this chapter is to determine the effect of naive explanations of accident on safety behaviour and on the perception of preventive actions. Secondly, to examine the interaction effect of age and accident experience on the effect of causal explanations on safety behaviour and on the perception of preventive actions. Thirdly, to check if naive casual explanations of hospital work accidents vary according to individuals' characteristics.

Explanation of accident by internal factors tends to encourage engagement in safety behaviour

Although our result is not significant, the direction of the outcome shows that providing dispositional factors in causal explanations of hospital work accidents tend to encourage HCWs involvement in safety behaviour. This can be explained by the findings of Boua (2021); Ngueutsa (2012); Rusch et al. (2003) and Tan and Xu (2019), that the more individuals explain accidents by personal factors that are controllable, the more they engage in positive behaviours. Certainly, Nigerian healthcare workers are likely to adopt safety behaviour when they attribute accident causes to individual factors. Referring to the results of our exploratory study, HCWs mostly mentioned that carelessness and improper safety practice are the major internal factors that leads to accident. In other words, recognizing these causal factors propels an individual to pay more attention to safety at work. Notwithstanding, there is need for more studies to validate this assumption. Moreover, as opposed to internal causal explanation and safety behaviour, people who explain accident by factors outside their control tend to adopt unsafe behaviour. This indicates that individual's fatalistic explanation can lead to

compromising safety actions based on the thought that external factors are uncontrollable. This is explained in the previous findings that explaining accident by external factors is related with unsafe behaviour (Goncalves et al., 2008; Kouabenan, 2013).

External causal explanation negatively predicts perceived effectiveness of preventive actions among HCWs

We hypothesized that explaining accidents by internal causal factors will strengthen the perceived effectiveness of preventive actions, nevertheless, we found otherwise. Our analysis shows that explaining accident by external causal factors leads to low perceived effectiveness of preventive actions. In other words, perceiving the effectiveness of preventive actions is weaker when HCWs explain accidents by situational factors (e.g., emergency, faulty equipment, crowded environment, etc.) than when they explain accident by personal factors (carelessness, lack of training, etc.). This is contrary to the result of the study by Mbaye et al. (2013) as they observed that the more experience-based analysis is judged as effective, the more internal causal factors are provided in explaining accident causes.

This means that HCWs are likely to judge preventive actions as less active when they attribute accident causes to environmental factors than to individual factors. Absolutely, other underlying factors may explain the relationship between workers external causal explanation and their perceived effectiveness of preventive measures. Moreover, we can explain that the state of the hospital preventive measures at the point of this study, may be a factor that is likely to influence workers judgment of preventive actions. Also, we can consider that age can be a factor when HCWs explain accident and perceive the effectiveness of preventive actions. On this note, we carried out an interaction test to establish this relationship.

The positive relationship between internal causal explanations and perceived effectiveness of preventive actions is stronger among younger HCWs than the older HCWs

We found that, the more younger health workers give internal causal explanations to accidents, the more they perceive that preventive actions are effective. This is contrary to the assumption that the negative relationship between external causal explanation and perceived effectiveness of preventive measures will be stronger among older HCWs than among the younger ones. This means that younger HCWs are likely to provide more internal causal explanation and perceive more the effectiveness of preventive actions than older ones. Although our previous analysis in chapter 7 did not establish a significant direct relationship between age and perceived effectiveness of preventive actions and between age and causal explanation, nevertheless, we have it that the joint effect of internal explanation and age leads to perceiving preventive actions as effective when workers are younger than when they are older. Specifically, Niza et al. (2008) and Gyekye (2010) had it that older people give more external causal explanation than younger people. This finding can explain the interaction between age and causal explanation in relation to perceived effectiveness of preventive actions. This can further be explored to understand the factors that influences the relationship between older workers explanation of accident and its relationship with their perceived effectiveness about preventive actions.

Finally, we did not establish a significant relationship between accident experience and causal explanations on safety behaviour. Notwithstanding, the regression slope do not go in the direction with the hypothesis that workers behaviour will be less safe when they give external causal accident explanation and have experience accident. It shows that individuals who have experience of accident tend to provide more internal

causal explanation and adopt more safety behaviour. Although the direction at which accident experience influences causal explanations are inconsistent. Kouabenan (1999, 2002) noted that accident experience increases the chances of involvement in safety behaviour. This can explain the interaction effect of causal explanations and accident experience on safety behaviour and on the perception of preventive measures. Furthermore, we did not take into consideration the number of accidents which can influence safety behaviour. This can be an area for future analysis to understand more how multiple accidents can influence the effect of causal explanations on safety behaviour and perceived effectiveness of preventive measures among HCWs. Previous research in this line (Ngueutsa, 2012) found that multiple accident experience can reduce adoption of safety behaviour and can jointly influence the effect of causal explanations of accident on safety behaviour (Boua, 2021; Goncalves et al., 2008).

Conclusion

We presumed that behaviour of workers will be safer when they explain accident by internal factors (Rusch et al., 2003; Tan & Xu, 2019) than when they attribute causes to external factors (Kouabenan, 2013; Goncalves et al., 2008) when explaining hospital work accident. Although the result is not significant, we see that explaining accidents by dispositional factors and situational factors are likely to motivate HCWs to take precaution.

Notwithstanding, it is important that HCWs understands the role of personal factors in accident. Taking responsibility in situations encourages adoption of safe behaviour (Boua, 2019; Tan & Xu, 2019). Therefore, building internal orientation of

HCWs towards hospital work risk can be beneficial. This can be achieved through safety training and workshops. According to Gyekye (2003), internal orientation entails the recognition of one's personal proficiency, self-responsibility for accident situations and self-acceptance. This can strengthen HCWs to give more dispositional factors in explaining hospital work accident because it has stronger positive influence on safety behaviour than the external causal explanation.

Moreover, constituting accident management team among healthcare workers can be helpful in monitoring HCWs accident situation, what is working and what needed to be improved on. Although this study added to existing knowledge, it has some limitations. As a limitation to this study, the scale measuring naive explanation of hospital accident needs to be revised and revalidated as it did not meet the criteria for the factor analysis in exploratory factor analysis. This will be elaborated in the general conclusion.

Chapter 9: Effect of risk perception on safety behaviour and on the perception of prevention actions

Introduction

Theories of health behaviour show that risk perception is a factor that can explain individuals' behaviour in the face of risk (Shanteau & Pingenot, 2009; Slovic, 1987). Risk perception is the subjective evaluation of risk (Ulleberg & Rundmo, 2003). According to Taylor and Synder (2017) overestimated perceived risk or underestimation of risk can explain individuals' behaviour of risk. This means that how people perceive risk can influence their behaviour. In the study of occupational risk and accident, Kouabenan (2002) and Kouabenan et al. (2006) noted that individuals' risk perception can be essential in risk and accident management and prevention. Indeed, managing hospital risks and accidents remains a fundamental issue in both public and private health institutions. According to Joseph and Josheph (2016), healthcare workers provide care and health related services to patients and the community at large. These services are but not limited to diagnostic or therapeutic services, emergency, hospital services, rehabilitation and other health care services. Regrettably, these health services expose healthcare workers to dreadful health hazards, such as biological risks (HIV, hepatitis B and C, influenza, MRSA , MERS, SARS, and VRE)⁸, physical risks which cuts across workers mental health, their physical and biological health, their economy, job license,

⁸ These biological risks faced by HCWs are listed as follows HIV: human immunodeficiency virus; MRSA: Methicillin-resistant Staphylococcus aureus; MERS: *Middle East Respiratory Syndrome*; SARS: *Severe acute respiratory syndrome*; VRE: Vancomycin-Resistant Enterococci, Hepatitis B and C

family, and societal wellbeing (The National Institute for Occupational Safety and Health, 2017).

Owing to the challenges of risks, Kouabenan and Cadet (2005), noted that the process of managing organizational risks and accidents begins with risk evaluation. According to these authors, the objective evaluation of risk mostly centers on norms, criterion-based and probability of occurrence, while subjective evaluation is based on personal assessment that represents perceived risk. While risk perception is known to influence behaviour, Kouabenan (2006d) noted that risk perception can be influenced by personal factors (Kouabenan, 2006d). This suggests that individual characteristics can play an important role on the subjective assessment of risk and safety behaviors. Indeed, we would anticipate that to improve health workers' engagement in safety actions, it will be imperative to understand their perceptions about hospital work risk and how these perceptions shape their behaviour at work. In addition, the way people perceive the effectiveness of preventive actions can be influenced by their risk perception. Therefore, we aim to investigate 1) the role of risk perception on healthcare workers behaviour at the workplace; 2) to examine the role of perception of hospital risk on perceived effectiveness of preventive actions; 3) to investigate the joint effect of personal characteristics and risk perceptions on safety behaviour and on the perception of preventive actions, and 4) to know if risk perception varies according to individual personal characteristics.

1. Problems and hypotheses

Nigerian hospital workers face several health risks that exposes them to accident and diseases (Isara et al., 2015). Consequently, assessing their perceptions about the risk

they face at work, can be useful in understanding hospital work risk, workers behavioural responses towards these risks and to offer an improved preventive and management strategies. Studies on risk perception affirms that risk perception is an important factor in explaining workers behaviour (Arezes & Miguel, 2008; Kouabenan & Cadet, 2005; Kouabenan et al., 2015; Tan & Xu, 2019). Over the years, much attention has been channeled towards objective assessment and management of work risks with less interest on the subjective assessment of work risks (Morrow & Crum, 1998). Although, objective evaluation of risk and its preventive measures has been widely applied in risk management, it may not be sufficient and has not remarkably changed work accident occurrences. According to Arezes and Miguel (2008), employees do not completely apply quantitative assessment of the risk they encounter at work. These authors remarked that in the face of hazards and uncertainty, workers mostly rely on their subjective evaluation of work risks which defines their risk perception, to take decisions and actions concerning the risks. The process of subjective risk assessment and decision making can be explained by the model of expected utility (Shanteau & Pinget, 2009) earlier discussed in chapter three. Additionally, Slovic (2000) noted that people see risk as the outcome of what they think is likely to occur, the probability of the event occurring and the likely consequence of the outcome on them. Hence, individuals' evaluation of risk can vary which can in turn vary their responses towards risk. Therefore, studying healthcare workers perceptions of hospital risks can help us understand their behaviour of risk and their perception of the effectiveness of preventive actions.

Certainly, the potential outcome of hospital risks may be undervalued by some health personnel who see these risks as more tolerable than a probable threat. This can explain their passivity to safety precautions at work. In this regard, research has shown

that underestimation of risks leads to improper behaviour. This finding has been established in the domain of work risk (Rao et al., 2017), road traffic perceived risk and safety behaviour among road users (Ivers et al., 2009; McCool et al., 2009; Ngueutsa & Kouabenan, 2017; Ram & Chand, 2016; Simsekoglu et al., 2013; Teye-Kwadjjo, 2019) and in perceived health risk and health safety behaviours (Brewer et al., 2007; Weinstein et al., 2007). Moreover, several other studies established that overestimation of risk leads to safe practices. Example, Brewer et al. (2012) found that participants who had a higher perception of the probability and perceived seriousness of getting an illness, tend to engage more in health behaviour of getting vaccinated. Likewise, Kouabenan and Safiétou (2015) observed that first line managers who high perception of the work risks surrounding the employees, tends to engage in safety actions. Additionally, the study by Neuburger and Egger (2021) on perceived risk of COVID-19, perception of travel risk and transit behaviour among travelers in the DACH district of Germany, show that high perception of the risk of COVID 19 and transit risks leads to avoidance behaviour and actions to abate risks. This implies that an individual who could rightly judge the capacity of risk to cause harm and the seriousness of the harm, is likely not to engage in actions that can jeopardize his safety. With reference to these findings, we propose to explore how perceived hospital risks among healthcare workers influences their behaviour. Therefore, we will hypothesize that perceived risk vulnerability (**H26a**), perceived risk severity (**H26b**), and perceived risk controllability (**H26c**) will be associated with safety behaviour.

Additionally, perceiving the effectiveness of preventive actions can be influenced by risk perception. There is lack of studies that aim to explore the link between risk perception and the perception of preventive actions. To establish this relationship, we will

verify if perception of preventive actions varies according to risk perception. Basically, when risks are perceived to be probable and severe, one may tend to believe that safety precautions are not effective in handling these risks. On the contrary, when risk is perceived as controllable, it can increase the perception of the effectiveness of preventive actions. Owing to this reasoning, we expect that high perceived probability of risk will negatively predict perceived effectiveness of preventive actions (**H27a**). Also, we anticipate that perceived severity of risk will have a negative relationship with the perceived effectiveness of preventive actions (**H27b**) and perceived controllability of risk will have a positive relationship with perceived effectiveness of preventive actions (**H27c**).

Moreover, in the study of risk perception and safety behaviour, Kouabenan (2006b) observed that risk perception can differ based on personal attributes of a risk perceiver (age, gender, study level, work experience, accident experience etc.) and on the characteristics of the risks itself (likelihood, severity, controllability). These individual factors were recognized by Siegrist et al. (2005) in his application of the psychometric model of risk perception to understand the underlying factors in peoples' perception of risk. Owing to age and variations in risk perception, most studies established that older people perceive more risks than the younger ones (Colbeau- Justin et al., 2008; Kouabenan, 1999). Accordingly, McCool et al. (2009) found that older beach goers reported higher perceived severity and vulnerability of risk than younger ones. Also, Alessia et al (2021) found that older people perceive higher the severity of the risk of getting infected with COVID-19. In line with this, Boyer (2006) found that younger people take more risk than their older counterparts which indicates that younger folks mostly underestimate the danger associated with personal risks. Following the outcome

of these studies, we will assume that the positive relationship between risk perception and safety behaviour will be stronger among older healthcare workers. Precisely, we would assume that the positive effect of perceived risk probability (**H28a**), perceived risk severity (**H28b**) and perceived risk controllability (**H28c**) on safety behaviour will be stronger when workers are advanced in age than younger ones.

We are also interested in examining the interaction effect of age and risk perception on the perception of preventive actions. We will assume that perceived risk probability will be higher and perceived effectiveness of preventive actions will lessen among older health workers than younger ones (**H29a**). Also, higher perceived severity of risk will be linked to lower perceived effectiveness when health workers are advanced in age (**H29b**). On the contrary, high perceived controllability will be associated with high perceived effectiveness of preventive actions, among older health workers than younger ones (**H29c**). In addition to age as a moderating variable between risk perception and behaviour, is accident experience.

Indeed, accident experience is considered as a non-negligible factor in risk perception. Specifically, according to the outcome of a study by Kouabenan et al. (2003), encounter of contamination with *Staphylococcus aureus* is linked with perceived risk vulnerability and other risks present in the hospital surroundings. In the same vein, Kung and Chen (2012) recorded that, survivors of earthquake experience, have high risk perception of earthquake compared to people who have no experience of an earthquake. Furthermore, Gletty (2017) study on the perceived risk of avalanche reveals that being a victim of avalanche accident is linked with greater perceived probability and perceived controllability of the risk and an improved involvement in safe behaviour. This means that practitioners who have been involved in avalanche accidents, anticipate that they could encounter this form of accident again than those who have no accident experience. Moreover, the study of Nguetsa and Kouabenan (2016) on perceived risk of road

accident among Cameroonian road users, reveal that respondents who are victims of one or two accidents have high perception of road risks and involve in more secured behaviour. Following the findings of the studies discussed above, we will anticipate that health workers will engage in more safety behaviour when they have high perceived probability of risk (**H30a**), high perceived severity of risk (**H30b**) and have experienced accidents at the workplace. On the contrary, we assume that when health workers perceive high the controllability of hospital risk and have experienced accident, they are likely to engage in unsafe behaviour than for those who have no experience of accident and perceives low the controllability of risk (**H30c**). This indicates that one is likely to adopt insecure behaviour when they have encountered accident and have high perceived risk controllability.

Finally, we propose that the negative relationship between perceived risk probability and perceived effectiveness of the preventive actions will be stronger for health workers who have experienced accident (**H31a**). Again, we will assume that perceiving the effectiveness of preventive actions will lessen when health workers have a high perception of risk severity and have experience of accident (**H31b**). In addition, high perceived risk controllability and accident experience will lead to higher perceived effectiveness of preventive actions (**H31c**).

2. Methodology

The methodology described in this chapter corresponds with the one described in chapter 7. This involves the same respondents and applies the same data collection procedure described previously. The scale for measuring safety behaviour is the same.

To avoid redundancy, we will focus on the description and validation of the scales of the measurement of risk perception.

2.1. Material

We used Likert type scales for measuring risk perception probability, risk perception severity and risk perception controllability for data collection, in addition to the scales on the perception of preventive measures and safety behaviour as discussed in chapter 7.

2.2. Measurement of hospital risk perception (probability, severity and controllability)

The scale for measuring risk perception was developed from the results of the interviews. Data from the responses of health workers forms the items in the questionnaire. Additionally, we gathered some knowledge from literatures on risk perception by healthcare workers (Kouabenan et al., 2007; Milhabet et al., 2002). The questionnaire was constructed to measure 3 characteristics of risk perception which are workers perceived susceptibility to risk, the level of severity of the risks and their perceived risk controllability. The 5 – point Likert type response scales, are made up of 10 items each on the hazards in a hospital environment (splash of biological fluid: blood and bodily fluids, HIV, falls, tuberculosis, needle stick injury, Lassa fever, cuts from sharps, molestation from patients and/or their relations). These items are same in the 3 scales measuring risk perception but with different instructions and responses to match the characteristic of risk perception being measured. The 3 scales on risk probability, risk severity and risk controllability are 5 – point Likert which respectively ranges from 1 = very low probability to 5 = very high probability; 1 = not serious at all to 5 = very much

serious; and 1 = not much control to 5 = very much control. The participants equally responded to perception of preventive action and safety behaviour. Additionally, the questionnaire contains questions on the sociodemographic and accident experience.

2.3. Procedure

The procedure applied in this chapter follows the same as described in chapter 7. The same data collection process and the same participants. We will present the validation of the three scales measuring perceived risk probability, perceived risk severity and perceived risk controllability. The three scales were not modified because the questions were very clear to the respondents. We will then present the internal consistency of the scales. The results of the validation of the scales will be elaborated in the following paragraph.

3. Results

3.1. Procedure for analyzing the results

Data analysis is performed with SPSS software V.25 and R version 4.1.2. Before carrying out the principal analysis, we first verified the validity of the measurement scales for perceived risk probability, perceived risk severity and perceived risk controllability. The internal structure of the scales was measured with Cronbach's alpha coefficient. This analysis was followed with the descriptive analysis of the items of the three scales measuring risk perception and the analysis to establish the relationship between the scales for risk perception, perception of preventive actions and safety behaviour. Next were the analysis of the link between the sociodemographic variables and risk perception. Lastly,

the results of the multiple regression analysis of the principal hypothesis were presented. To analyze the main hypothesis, perception of preventive actions and safety behaviour were employed as the dependent variables while the three dimensions of risk perception were used as the independent variables. In the interaction analysis, the independent variables of age and risk perceptions were first centered before applying the regression analysis. Additionally, sociodemographic variables were introduced as controlling variables in the hypotheses of the study.

3.2. Preliminary data analysis

This section presents the validation of the scales for perceived risk probability, perceived risk severity and perceived risk controllability. Subsequent subheadings present the outcome of the exploratory factor analysis (EFA) and Cronbach's alpha coefficient.

3.2.1. Validation of the scale of perceived probability of hospital risks

The validated scale of perceived hospital risk probability has 10 items with a very satisfactory internal consistency ($\alpha = .90$). Factor analysis on this scale shows the existence of one scale with factor that explains 49.31% of the variance. This factor aligns with the perceived probability of risks related with hospital work (Getting infected with hepatitis infection (B or C), getting injury from sharps (blades etc.), contracting Lassa fever infection, contracting HIV, getting needle stick injury etc.). (See Annex 9, p. 376).

3.2.2. Validation of the scale for measuring risk perception severity

The scale of perceived hospital risk severity has 10 items and valid with a very satisfactory internal consistency ($\alpha = .94$). The factor analysis reveals one scale which corresponds to the perceived hospital risk severity (Contracting HIV, getting infected with Hepatitis B or C infection, getting needle stick injury, contracting tuberculosis, contracting Lassa fever etc.). The 1 factor explains 60.25% of the variance. The total score of participants will be determined by mean scores to the 10 items. Higher mean scores show a strong perceived hospital risk severity. (See Annex 10, p. 378).

3.2.3. Validation of scale of risk perception controllability

The results of the reliability test of Cronbach's alpha shows a high internal consistency ($\alpha = .92$). One scale was extracted from the exploratory factor analysis which matches with the perceived risk controllability of hazards in hospital environment (getting injury from sharps (blades etc.), contracting HIV, getting needle stick injury, getting infected with Hepatitis B or C infection, contracting Tuberculosis etc.) and explains 53.62% of the variance. Participants' global score will be determined by mean score to the 10 items. Higher mean scores show a strong perceived hospital risk controllability. (See Annex 11, p. 382). The summary of the validation results is seen in table 19.

Table 19

EFA and Validation of the scales for risk perception probability, risk perception severity and risk perception controllability

Variables	N of items	Total	% of Var	% of CV	<i>r</i>	α
Risk perception probability	10	4.94	49.42	49.42	.49	.90
Risk perception severity	10	6.01	60.08	60.08	.61	.93
Risk perception controllability	10	5.34	53.37	53.37	.53	.91

Note: EFA: exploratory factor analysis; N of Items: number of items; % of Var: percentage of variance; % of CV: cumulative variance percentage; *r*: Mean inter-item correlation; α : Cronbach's alpha

3.3. Descriptive analyses of the data

Before we analyzed the principal hypotheses, we carried out a descriptive analysis to summarize the data for each variable and to explain the intercorrelation between the risk perception scales and safety behaviour scale. The descriptive analysis shows the mean and standard deviations⁹. Following the descriptive analysis of the data is the verification analysis to establish if risk perception varies according to sociodemographic variables.

3.3.1. Descriptive analyses result of the perceived risk probability scale

The descriptive analysis of the data for perceived probability of risk explains the hospital risk that is mostly perceived to be likely by healthcare workers. The data outlined in Table 20 shows that health workers perceive more probable the risk of contracting Lassa fever ($M = 3.17$; $SD = .40$), followed by the risk of splash of biological fluid (blood

⁹ The descriptive analysis provides a conclusion for the distribution of data showing the mean and the standard deviations of the items for the variables of study

and bodily fluid) (M = 3.15; SD = .28); getting needle prick injury (M = 3.02; SD =); getting injury from sharps like surgical blades (M = 2.98; SD = .32) and psychological distress (M = 2.93; SD = .34). The risk perceived by the health workers to be less probable is the risk of injuries from falls (M = 2.11; SD = .14).

Table 20

Descriptive statistics of items measuring perceived hospital risk probability

Items	Mean	Std. D
Contracting viral Lassa fever	3.17	.40
Having splash of biological fluid (blood and bodily fluids)	3.15	.28
Getting needle stick injury	3.02	.28
Getting injury from sharps (blades etc.)	2.98	.32
Psychological distress	2.93	.34
Physical attack from patients and relatives	2.77	.37
Getting infected with Hepatitis infection (B or C)	2.75	.27
Contracting Tuberculosis	2.61	.23
Contracting HIV ¹⁰	2.48	.22
Injuries from falls that may lead to fracture or bruises	2.11	.14

3.3.2. Descriptive analyses of the results of the perceived risk severity scale

Table 21 shows the risk health workers perceives to be serious if it is encountered. This shows that HCWs can differentiate the level of severity of the various risks they face at the workplace. We see that workers place importance on the severity of the risk of contracting Lassa fever (M = 4.09; SD = .25). The next important risk which health workers consider to be serious is the risk of getting infected with hepatitis B or C (M = 3.91; SD = .26), this is followed by the risk of contracting HIV (M = 3.87; SD = .37) and

¹⁰ HIV stands for human immunodeficiency virus is one of the major retroviral infections that affects the immune system. Others include Hepatitis B and C and Lassa fever.

the risk of contracting tuberculosis (M = 3.75; SD = .32). This is followed by the risk of needle stick injury (M = 3.67; SD = .30) and the risk of injury from sharps (M = 3.61; SD = .31). The risk that is perceived to be less serious is the risk of injury from falls (M = 3.28; SD = .33).

Table 21

Descriptive statistics of items measuring perceived hospital risk severity

Items	Mean	Std.D
Contracting Lassa fever	4.09	.25
Getting infected with Hepatitis infection (B or C)	3.91	.26
Contracting HIV	3.87	.37
Contracting Tuberculosis	3.75	.32
Getting needle stick injury	3.67	.30
Getting injury from sharps (blades etc.)	3.61	.31
Physical attack from patients and relatives	3.38	.35
Having splash of biological fluid (blood and bodily fluids)	3.31	.31
Psychological distress	3.29	.32
Injuries from falls that may lead to fracture or bruises	3.28	.33

3.3.3. Descriptive analyses of the results of the perceived risk controllability scale

The descriptive statistics outlined in Table 22 explains the level of perceived controllability of the various hospital risks by health workers. This indicates that some hospital risk can be perceived to be controllable while some could be considered as less controllable. Health workers perceive more controllable the risk of contracting HIV (M = 3.85; SD = .19). Following is the by the risk of getting infected with Hepatitis infection (B or C) (M = 3.73; SD = .10), this is followed by the risk of contracting tuberculosis (M = 3.63; SD = .20) and the risk of getting needle stick injury (M = 3.59; SD = .20). The risk that is less perceived to be controllable psychological distress (M = 3.07; SD = .29).

Table 22

Descriptive statistics of items measuring perceived hospital risk controllability

Items	Mean	Std.D
Contracting HIV	3.85	.19
Getting infected with Hepatitis infection (B or C)	3.73	.10
Contracting Tuberculosis	3.63	.20
Getting needle stick injury	3.59	.20
Contracting Lassa fever	3.58	.25
Having splash of biological fluid (blood and bodily fluids)	3.51	.24
Getting injury from sharps (blades etc.)	3.51	.21
Injuries from falls that may lead to fracture or bruises	3.45	.22
Physical attack from patients and relatives	3.18	.30
Psychological distress	3.07	.29

In summary, the risk perceived by health workers to be more probable is the risk of contracting Lassa fever ($M = 3.17$; $SD = .40$), the risk perceived as more serious is the risk of contracting Lassa fever ($M = 4.09$; $SD = .25$) and the risk perceived as more controllable is the risk of contracting HIV ($M = 3.85$; $SD = .19$).

Table 23

Summary of descriptive statistics of the mostly perceived hospital risk probability, severity and controllability

Perceived risk	Items	Mean	Std.D
Probability	Contracting Lassa fever	3.17	.40
Severity	Contracting Lassa fever	4.09	.25
Controllability	Contracting HIV	3.85	.19

**3.3.4. Relationship between the different variables of study:
perceived risk probability, perceived risk severity, perceived risk
controllability, perception of preventive action and safety behaviour**

The preliminary results show that risk perception severity has a positive significant relationship with safety ($r = .11, p < .01$). Which means that the more the risk is perceived as severe, the more health care workers adopt safety behaviour. Perceived risk severity also has a positive correlation with perception of preventive action ($r = .30, p < .01$), perceived risk probability ($r = .44, p < .01$), and perceived risk controllability ($r = .43, p < .01$), which means that when workers perceive high severity of risk, they tend to perceive the effectiveness of preventive actions, risk probability and risk controllability. There is a positive correlation between perception of preventive action and safety behaviour ($r = .12, p < .01$) and with perceived risk controllability ($r = .30, p < .01$), but not with perceived risk probability. The more health workers perceive the effectiveness of preventive measures, the more health workers adopt safety behaviour and the more they perceive that risk is controllable. There is no significant relationship between perceived risk probability, perceived risk controllability and safety behaviour (See table 24).

Table 24

Descriptive statistics and inter-correlational analysis among variables of study: risk perception probability, risk perception severity, risk perception controllability, perception of preventive actions and safety behaviour

Variables	M	SD	1	2	3	4	5
Perceived risk probability	2.80	.94	1				
Perceived risk severity	3.61	.10	.44**	1			
Perceived risk controllability	3.51	.93	.06	.43**	1		
Perceived effectiveness of preventive actions	4.31	.71	.21	.30**	.30**	1	
Safety behaviour	3.48	.52	.05	.11**	.03	.12**	1

* < .05; ** < .01; *** < .001.

3.3.5. Variability of risk perception according to socio-demographic variables

Here, we assessed the influence of personal socio-demographic factors on risk perception. The selected personal socio-demographic variables are age, gender, professional experience, professional category, accident experience, accident severity, education level, and hospital type.

Risk perception and age

To test whether the dimensions of risk perception vary according to age, we carried out a regression analysis with age as the independent variable and the dimensions of risk perceptions as the dependent variable. We observed that hospital risks are not perceived differently according to age. Specifically, there was no significant difference between age and perceived risk probability, $b = 0.04$, $R^2 = 0.00$, $t(607) = 1.17$, IC 95% [-0.00, 0.01], $p = .24$; perceived risk severity $b = 0.06$, $R^2 = 0.00$, $t(607) = 1.43$, IC 95% [-0.01, 0.02], $p = .15$ and perceived risk controllability $b = 0.06$, $R^2 = -0.00$, $t(607) = -1.00$, IC 95% [-0.02, 0.01], $p = .32$.

Risk perception and gender

To run a linear regression, gender was recoded into (-1) for women and (1) for men. The regression analysis shows a significant difference between gender and perceived risk susceptibility, $b = -0.15$, $R^2 = 0.05$, $t(607) = -3.57$, IC 95% [-0.43, -0.13], $p = .001$. Generally, women perceive they are more probable to be confronted with hospital risk than men. Risk perception severity do not significantly vary according to gender $b = -0.04$, $R^2 = 0.00$, $t(607) = -1.05$, IC 95% [-0.13, 0.04], $p = .30$. More so, perceived risk controllability does not significantly differ according to gender, $b = -0.00$, $R^2 = 0.00$, $t(607) = -0.04$, IC 95% [-0.08, 0.07], $p = .97$. The results confirmed that only perceived probability of risk varies according to gender.

Risk perception and accident experience

We observed that perceived risk varies according to accident experience, in that people who have been victim of accident at the workplace have a high perceived likelihood of work risk, $b = 0.08$, $R^2 = 0.09$, $t(610) = 2.01$, CI 95% [0.00, 0.15], $p = .05$. The result also shows that workers who have experienced accidents judge more hospital risk to be severe, $b = 0.13$, $R^2 = 0.05$, $t(610) = 3.32$, CI 95% [0.06, 0.22], $p = .001$. Perceived risk controllability does not significantly differ according to accident experience $b = -0.03$, $R^2 = 0.00$, $t(610) = -0.72$, CI 95% [-0.10, 0.05], $p = .47$. In general, having experience of accident at workplace increases health workers perceived risk susceptibility and severity of risk outcome. The perception of risk controllability does not differ significantly among victims or non-victims of accidents.

Risk perception and professional years of experience

The results show that likelihood of hospital risk is perceived differently according to professional experience. Precisely, perceived risk probability is higher among workers with longer years of work experience, $b = 0.08$, $R^2 = 0.10$, $t(607) = 1.99$, IC 95% [0.00, 0.23], $p = .05$. There were no significant differences in years of experience and perceived risk severity $b = 0.05$, $R^2 = 0.00$, $t(607) = 1.26$, IC 95% [-0.05, 0.21], $p = .21$ and perceived risk controllability $b = -0.01$, $R^2 = 0.00$, $t(607) = -0.15$, IC 95% [-0.12, 0.11], $p = .88$. The results show that workers who have spent many years in the hospital work perceive more the probability of risk than those who have few years of work experience. Whereas perceived risk severity and perceived risk controllability do not vary based on the length of service years.

Risk perception and education level

We observed a trend significant effect of education level on perceived risk probability, $b = 0.08$, $R^2 = 0.00$, $t(606) = 0.04$, IC 95% [-0.02, 0.29], $p = .08$. On the other side, perceived severity of risk significantly varies according to education level, $b = 0.14$, $R^2 = 0.02$, $t(606) = 3.11$, IC 95% [0.10, 0.44], $p = .002$. This shows that the higher healthcare workers acquire education, the more they perceive that hospital work risk consequence is severe. Moreover, we did not see a significant link between perceived risk controllability and education level, $b = 0.03$, $R^2 = 0.00$, $t(606) = 0.55$, IC 95% [-0.11, 0.19], $p = .58$. The results did not confirm our hypothesis that perceived risk likelihood and perceived risk controllability differs based on education level except for perceived risk severity.

Risk perception and hospital type

The linear regression analysis shows that risk perception varies according to hospital type. Health workers in the public hospitals consider themselves more likely to be exposed to hospital risk than health workers in the private hospitals, $b = 0.18$, $R^2 = 0.12$, $t(603) = 4.48$, IC 95% [0.11, 0.27], $p = .001$. Regarding perceived severity of risk, we observed a significant difference between hospital workers in the public hospital and those in private hospital, $b = 0.05$, $R^2 = 0.41$, $t(603) = 8.82$, IC 95% [0.31, 0.49], $p = .001$. This shows that the severity of hospital risks is perceived more in public hospital than in private hospital. Also, health workers in public hospitals perceive more the controllability of risk than health workers in private hospitals, $b = 0.21$, $R^2 = 0.08$, $t(603) = 5.26$, IC 95% [0.14, 0.30], $p = .001$. These results confirm the expectations that risk perception will vary according to hospital type.

Risk perception and accident severity

The results showed that risk perception varies significantly on the severity of accident experienced by accident victims. Specifically, perceived risk probability significantly varies based on severity of accident, $b = -0.13$, $R^2 = 0.00$, $t(291) = 5.26$, IC 97.5% [0.14, 0.30], $p = .001$. Precisely, no injury group perceive less the probability of risk compared to other groups ($M = -0.19$), followed by light injury group ($M = 0.11$) and the severe injury group ($M = 0.31$). The analysis also showed a significant difference in perceived risk severity and the severity of accident, $b = -0.12$, $R^2 = 0.01$, $t(291) = -2.16$, IC 97.5% [-0.22, -0.01], $p = .03$. Particularly, no injury group perceive less the severity of risk compared to other groups ($M = -0.05$), followed by light injury group ($M = 0.16$) and the severe injury group that perceived more the severity of risk ($M = 0.45$). We did

not record any significant difference in perceived risk controllability among the three groups of accident severity. $b = -0.01$, $R^2 = 0.21$, $t(291) = -0.08$, IC 97.5% [-0.17, 0.15], $p = .94$.

3.4. Testing of hypotheses

To examine our hypotheses, we applied multiple linear regression analyses with the socio-demographics as the controlling or moderating variables. We first analyzed the relationship between risk perception and safety behaviour. The next analysis is on the direct relationship between risk perception and perception of preventive actions. Finally, we analyze the combined effect of selected sociodemographic (age, study level and accident experience) and risk perception on safety behaviour and on the perception of preventive actions.

3.4.1. Effect of risk perception (probability, severity and controllability) on safety behaviour and on the perception of preventive actions

Here we present the direct effect of risk perceptions on safety behaviour and on the perceived effectiveness of preventive actions. The three categories of risk perception are the independent variables while safety behaviour and perception of preventive actions are the dependent variables.

Effect of risk perception on safety behaviours

We did not observe a significant relationship between perceived risk probability and safety behaviour $b = 0.04$, $R^2 = 0.01$, $t(610) = 0.99$, IC 95% [-0.02, 0.07], $p = .32$.

On the other hand, there was a significant positive link between perceived risk severity and safety behaviour, $b = 0.10$, $R^2 = 0.03$, $t(610) = 2.25$, IC 95% [0.01, 0.08], $p = .025$. That means that the more health workers perceive the severity of risk, the more they engage in safety behaviour. In contrast, the relationship between perceived risk controllability and safety behaviour is not significant, $b = 0.03$, $R^2 = 0.01$, $t(610) = 0.68$, IC 95% [-0.03, 0.06], $p = .49$. Specifically, the results confirmed our hypothesis **H26b** showing that the more healthcare workers recognize the severity of risk consequences at work, the more they engage in safety behaviour. Our hypothesis **H26a** and **H26c** were not confirmed.

Effect of risk perception on the perception of preventive actions

The results of our analysis show a positive and statistically significant link between perceived risk probability and perceived effectiveness of preventive actions, $b = 0.16$, $R^2 = 0.09$, $t(607) = 5.31$, IC 95% [0.17, 0.38], $p = .001$. Perceived risk severity also predicts perceived effectiveness of preventive actions, $b = 0.30$, $R^2 = 0.28$, $t(607) = 7.63$, IC 95% [0.32, 0.54], $p = .001$. In other words, when health workers perceive the probability of risk and the severity of risk, they tend to perceive that preventive actions are effective. The result was contrary to our hypotheses **H27a** and **H27b**, which states that high perception of the probability and severity of risk will be negatively associated with perception of the effectiveness of preventive actions. We also observed a positive and significant link between perceived controllability of risk and perceived effectiveness of preventive actions, $b = 0.24$, $R^2 = 0.30$, $t(607) = 7.83$, IC 95% [0.17, 0.30], $p = .001$. Hence, our hypotheses **H27c** was validated indicating that perceived risk controllability is positively linked with perceived effectiveness of preventive actions. So, when health

workers perceive that risk is controllable, they tend to have a high perceived effectiveness of preventive actions.

3.4.2. Moderating effect of age on the link between risk perception and safety behaviour and moderating effect of age on the link between risk perception and perception of prevention actions

Moderating effect between age and risk perceptions on safety behaviour

Here, we test the interaction effect between risk perception and age on safety behaviour. The hypothesis stipulates that the more health workers advance in age and perceives hospital risks as high, the more they engage in safety behaviour (**H28a, b, c**). The results show that the joint influence of perceived risk probability and age on safety behaviour is not significant, $b = -0.00$, $R^2 = 0.00$, $t(607) = -0.33$, 95% CI $[-0.01, 0.00]$, $p = .74$. We also find no significant interaction effect between risk perception severity and age on safety behaviour, $b = -0.00$, $R^2 = 0.00$, $t(607) = -0.86$, 95% CI $[-0.01, 0.00]$, $p = .39$. Also, the results indicate non-significant interaction between perceived risk controllability and age on safety behaviour, $b = 0.00$, $R^2 = 0.67$, $t(607) = -0.20$, 95% CI $[-0.01, 0.00]$, $p = .84$. Hypotheses **H28a**, **H28b** and **H28c** were not confirmed.

Moderating effect between age and risk perceptions on perceived effectiveness of preventive actions

In this section, we investigated the joint effect of age and risk perception (probability, severity, controllability) on safety behaviour. Our hypothesis (**H29a**) predicts that perceived effectiveness of preventive actions will lessen when health workers have high perceived risk probability and are advanced in age. In other words, the negative link between risk perception and the perception of preventive actions will be

weaker among older health workers. The results obtained, show no significant joint effect, $b = -0.00$, $R^2 = 0.27$, $t(607) = -0.13$, 95% CI $[-0.01, 0.01]$, $p = .89$. Therefore, hypothesis (H29a) was not confirmed. Also, there was no significant interaction between perceived severity of risk and age on perceived effectiveness of preventive action, $b = 0.00$, $R^2 = 0.69$, $t(607) = 0.21$, 95% CI $[-0.01, 0.01]$, $p = .83$. This do not confirm our hypothesis (H29b) which predicts that higher perceived severity of risk will be linked to lower perceived effectiveness when health workers are advanced in age. Moreover, our assumption (H29c) that perceive effectiveness of preventive actions will be higher when health workers perceive high risk controllability and are advanced in age was not verified, $b = -0.00$, $R^2 = 0.00$, $t(607) = -0.53$, 95% CI $[-0.01, 0.01]$, $p = .59$.

3.4.3. Moderating effect of accident experience on the link between risk perception and safety behaviour and moderating effect of accident experience on the link between risk perception and perception of prevention actions

Moderating effect between accident experience and risk perceptions on safety behaviour

In this section, we test the hypothesis that safety behaviour will be higher when health workers experience accident and perceives risk at workplace (H30a, b, c). These assumptions posit that workers are likely to engage in safe behaviour when they have experienced accident and perceive risk probability as high H30a and perceive the seriousness of risk as high H30b. On the other hand, health workers who have accident experience and have high perception of risk controllability will be associated with unsafe behaviour H30c. The results show no significant combined effect of perceived risk

probability and accident experience on safety behaviour, $b = 0.06$, $R^2 = 0.00$, $t(607) = 1.45$, 95% CI [-0.02, 0.15], $p = .15$. Furthermore, the joint effect of perceived risk severity and accident experience on safety behaviour is not significant, $b = -0.01$, $R^2 = 0.00$, $t(607) = -0.29$, 95% CI [-0.09, 0.07], $p = .78$. Hypotheses **H30a**, and **30b** were not confirmed. However, figure 45 show that the interaction link between perceived risk controllability and accident experience on safety behaviour is significant, $b = -0.16$, $R^2 = 0.02$, $t(607) = -3.41$, 95% CI [-0.24, -0.07], $p = .001$. This last result is contrary to our hypothesis **H30c** that insecure behaviour will be higher among workers who had experienced accident and perceives high the controllability of hospital risk. Precisely, figure 46 show that behaviour is safer among HCWs who have no accident experience and perceives high the controllability of risk.

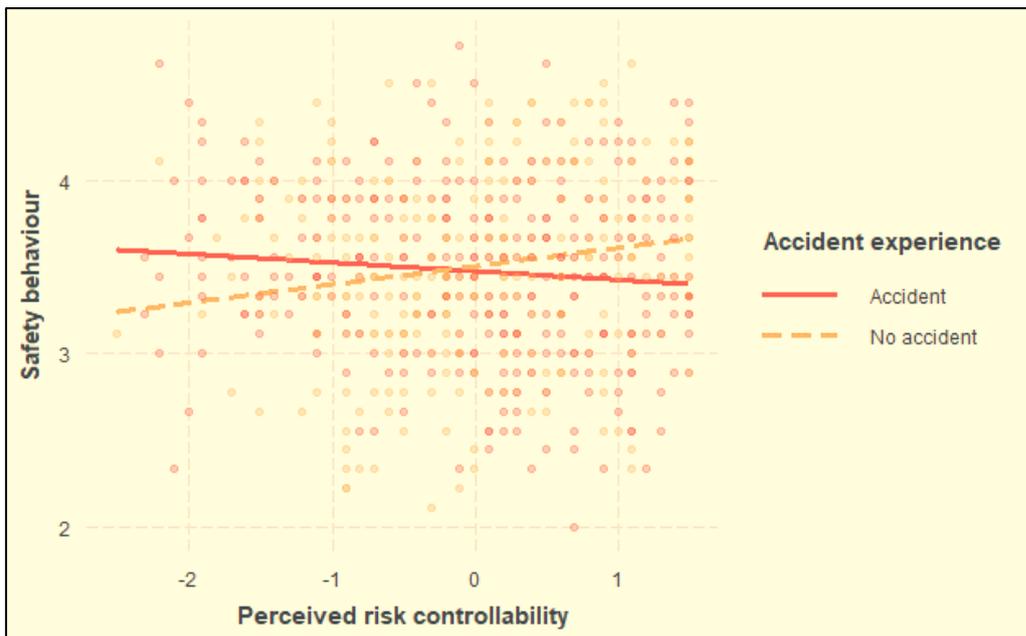


Figure 46: Interaction effect of risk perception controllability and accident experience on safety behaviour

Moderating effect between accident experience and risk perception on perceived effectiveness of preventive actions

In this section, we investigate the interaction between accident experience and the perception of risk regarding perceived effectiveness of preventive actions. Our hypothesis **H31a** predicts that the negative relationship between perceived risk probability and perceived effectiveness of the preventive actions will be stronger for health workers who have experienced accident than those with no accident experience. The result is contrary to our assumption, $b = -0.14$, $R^2 = 0.01$, $t(607) = -2.33$, 95% CI $[-0.26, -0.02]$, $p = .02$. Figure 47 show that health workers who have no accident experience tend to perceive high the effectiveness of preventive actions when they perceive high the probability of risk.

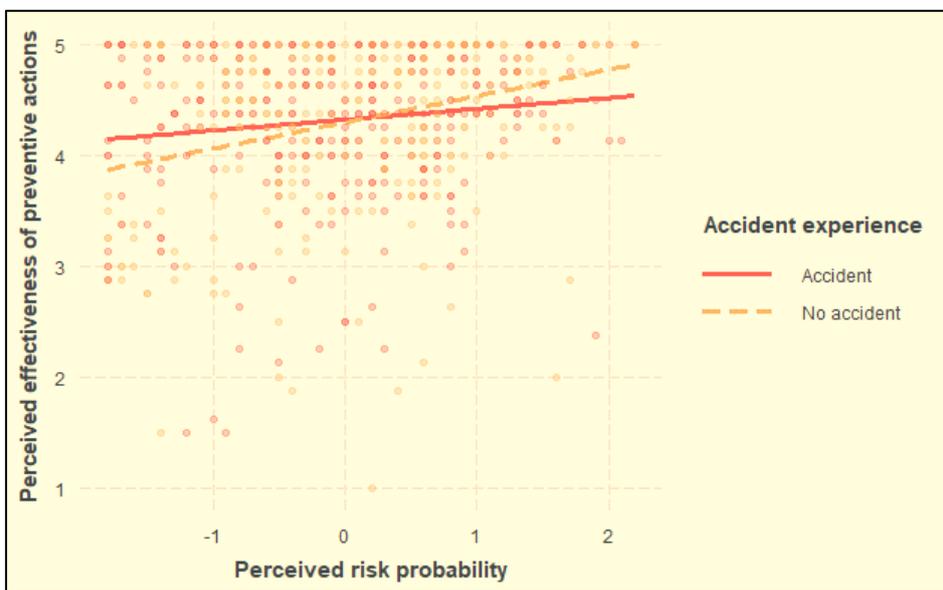


Figure 47: Interaction effect between perceived probability of risk and accident experience on perceived effectiveness of preventive actions.

Furthermore, hypothesis **H31b** stipulates that perceiving the effectiveness of preventive actions will be low when health workers have a high perceived severity of hospital risk and have

experience of accident. We find from the result no significant interaction, $b = -0.00$, $R^2 = 0.36$, $t(607) = -0.15$, 95% CI [-0.06, 0.09], $p = .88$. Hence, hypothesis **H31b** was not verified. More so, hypothesis **H31c** which predicts that perceived risk controllability when accident is experienced, will lead to lower perceived effectiveness of preventive actions The result show no significant joint influence, $b = 0.03$, $R^2 = 0.13$, $t(607) = 0.88$, 95% CI [-0.03, 0.09], $p = .38$. Therefore, our hypothesis was not confirmed.

Table 25

Summary of the main results on the relationship between risk perception and safety behaviour and the link between risk perception and the perception of preventive actions

Variables	Safety behaviour			Perception of preventive actions		
	<i>b</i>	<i>t</i>	R^2	<i>b</i>	<i>t</i>	R^2
Perceived risk probability (RPP)	.04	.99	.01	.16***	5.31	.09
Perceived risk severity (RPS)	.10**	2.25	.03	.30***	7.63	.28
Perceived risk controllability (RPC)	.03	.68	.01	.30***	7.83	.30
RPP X AGE	-.00	-.33	.00	-.00	-.13	.27
RPS X AGE	-.00	-.86	.00	.00	.21	.69
RPC X AGE	-.00	-.20	.67	-.00	-.53	.00
RPP X Accident experience	.06	1.45	.00	-.14*	-2.33	.01
RPS X Accident experience	-.01	-.29	.00	-.00	-.15	.36
RPC X Accident experience	-.16***	-3.41	.02	.03	.88	.13

Note: RPP: risk perception probability; RPS: risk perception severity; RPC: risk perception controllability

* < .05; ** < .01; *** < .001.

4. Discussion

The objective of our analysis in this chapter was to examine the effect of risk perception on safety behaviour and on the perceived effectiveness of preventive actions among healthcare workers. We also aim to observe the combined effect of risk perception and selected individual attributes (age, accident experience) on safety behaviour and on

the perception of preventive actions. More so, we aim to see how personal characteristics of health workers can impact their risk perceptions. Some of our results confirmed our hypotheses which were in line with scientific findings discussed in this chapter and in the theoretical chapter 3. Moreover, some of the findings were contrary to our expectations and existing literature.

A positive influence of perceived risk severity on safety behaviour

The results recorded in our analysis showed that perceiving the severity of risk encourages involvement in safety behaviour. This supports the scientific findings that high perceived risk severity positively influences behaviour (Brewer et al., 2012; Kouabenan et al., 2015; McCool et al., 2009). Narrowing it down to the specific nature of risk, perceiving the severity of risk by HCWs which can be explained as correctly recognizing the seriousness of risk outcome, increases HCWs tendency to get involved in safety actions that can minimize the occurrence of risk. This result is in corroboration with the findings of Carico et al. (2021) and Kayani et al. (2021), who applied health model theory in risk perception and safety intention and find that perceived severity of risk is very much significantly and positively linked with the intention to engage in safety behaviour. Besides, a significant relationship was not found between perceived risk probability and safety behaviour and between perceived risk controllability and safety behaviour. This could mean that HCWs are more concerned about the negative effect of hospital risk than in its occurrence or controllability. Moreover, it may be that accident severity is more publicized on at work, such as the contraction of dreaded diseases like COVID 19, HIV, hepatitis, tuberculosis, Lassa fever, etc.

When the seriousness of risk is well recognized, and safety behaviour upheld, the probability of risk occurring can indirectly reduce and workers may perceive that hospital risk can be controlled. In essence, risk severity seems to be a major concern among HCWs. This is also seen from the exploratory study carried out with HCW, when asked to define risk. The analysis shows that 47% out of the 6 categories of the definitions of risk provided by HCWs is that “risks are factors that can cause harm” and 20% are the “negative outcome of an event”. This shows that HCWs are more concerned about the dreadful outcome of hospital hazards.

We also found that perceived severity of risk is related with experience of severe accident than accident experience with no injury. This means that when health workers experience severe or serious accident, they will have high perceived severity of their hospital work risk compared to those who have experience accident with light or no injury. Although the experience of severe accident is not found to influence safety behaviour, it is an important factor in perceived severity of risk. There is need to explore more on this link between perceived severity of risk, experience of severe accident and safety behaviour.

Perceiving risk positively influences the perceptions of preventive actions

Perceiving the effectiveness of preventive actions, are predicted to be negatively related to the perception of risk probability and risk severity. This simply mean that when workers have a high perception of the likelihood of risk and a high perception of the severity of such risks, they will tend to believe that the preventive actions are not efficient to address these risks. Surprisingly, we recorded the contrary, although health workers perceive high the probability and high the severity of hospital risks, they also perceive

high the effectiveness of preventive measures. This could mean that perceiving risk does not influence health workers to believe that the actions taken to manage risk is not effective. We can rely on their education level to explain this relationship. Their education level may inform their perception about risk as we found that the more health workers advance in their education, the more they perceive the severity of risk and the more they perceive the probability of risk. Equally, they may have the thought that situations can be worse if these actions are not taken in the first place. Therefore, perceiving hospital risk does not deter health workers from believing that preventive measures are not effective. Moreover, workers who perceive that hospital risks are controllable, are likely to uphold a positive perception about the effectiveness of preventive actions. Indeed, risk perception is a crucial factor in explaining workers behaviour towards risk and their perception of the effectiveness of preventive measures.

Perceived risk controllability and accident experience jointly and positively influence safety behaviour for HCWs who have no accident experience than those who have experienced accident

The interaction between accident experience and perceived risk controllability on safety behaviour is positively significant. This finding is contrary to our hypothesis which predicts that the negative relationship between perceived controllability of risk and safety behaviour will be stronger among workers who have experienced accident compared to those with no accident experience. In other words, safety behaviour is stronger for workers who have experienced accident and perceives high controllability of work risks. Generally, most studies (Gletty, 2017; Ngueutsa & Kouabenan, 2016) recorded a positive interaction effect between risk perception and accident experience on safety behaviour. That is, victims of accident perceive greater risks and tends to involve in unsafe

behaviour. Contrary to these findings we found that individuals who have never been victims of accident perceives more the controllability of risk and most likely engage in safe behaviour.

Moreover, we did not record significant interaction effect between accident experience and perceived risk probability on safety behaviour and between accident experience and perceived severity of risk on safety behaviour. The hypotheses predicts that safety behaviour will be stronger among health workers who are victims of accident and perceives high the probability and severity of risks. Even though this moderation effect is not significant, it shows a negative relationship between perceived risk probability and perceived severity on safety behaviour among workers who are victims of accident which is contrary to our prediction. This may be explained by the nature of accident either serious or less serious accident or based on the number of accidents. For instance, Lindell and Perry (1990) found that exposure to serious accident reduces the perception of risk. Also, the study of Ngueutsa and Kouabenan (2017) show that the more people encounter accident, the less they perceive the severity of risk and the less they involve in safety behaviour. Based on the differences on how accident experience relates with risk perception to affect behaviour, and considering that our results are not significant, further studies are necessary to verify this relationship.

Additionally, the interaction effect between perceived risk probability, perceived risk severity, perceived risk controllability and age on safety behaviour were not significant. Our exploratory study on the link between age and safety behaviour in the previous chapter indicates that the higher the age, the more individuals involve in safety behaviour. Studies like that of Otani et al. (1992) found that high risk perception is associated among older people, and they tend to respect warning sign more than the

younger ones. These relationships directly explain safety behaviour, but their interaction effect is yet to be confirmed.

Perceived risk probability and accident experience jointly and positively influence perceived effectiveness of preventive actions for HCWs who have no accident experience than those who have experienced accident

Interestingly, accident experience positively moderates the effect of perceived risk probability on the perceived effectiveness of preventive actions for health workers who have no experience of accident than those who have experienced accident. This finding is contrary to our assumption that perceived effectiveness of preventive actions will be weaker when HCWs perceives high likelihood of risk and have experienced accident. Therefore, when one has no experience of accident and perceives high probability of risk, they tend to perceive that, preventive actions are effective. Like we found earlier, education can be an underlying factor in the perception of preventive actions. Let's also recall that there is a positive link between perceived probability of risk and perception of preventive actions. Hence individuals who have high perceived risk likelihood and have not experienced accident, they tend to perceive high the effectiveness of preventive actions. On this regard, we established that interaction between perceived risk probability and accident experience leads to perceived effectiveness of preventive actions when one has no experience of accident.

Additionally, it is observed that the interaction between accident experience and perceived risk severity on perceived effectiveness of preventive actions is not significant. Although the interaction is not significant, perceived effectiveness of health workers is low when they have high perceived severity of risk and have experienced accident. Also,

the interaction link between perceived controllability of risk and accident experience on perceived effectiveness of preventive actions is not significant. Nevertheless, the direction of the interaction show that high perceived controllability and experience of accident leads to high perceived effectiveness of preventive actions. For this analysis, we did not consider the number of accident that workers are exposed to and how they influence their perceived effectiveness of safety actions. According to Ngueutsa and Kouabenan (2017b), the more people are exposed to accident, the less they perceive risk road risk as severe. Therefore, frequency of exposure to accident can influence perception and the judgement of the effectiveness of the preventive actions. This avails the opportunity for further analysis to understand better how accident experience and perceived risk severity and perceived risk controllability affects perception of preventive actions.

Furthermore, the interaction link between age and risk perception on the perception of preventive actions, for the three categories of risk perception (probability, severity, controllability) were all insignificant. We could refer to our analysis on the link between age and risk perception (see chapter 7). The results show that age has no relationship with the way health workers perceive preventive actions. Therefore, this insignificant relationship between age and perceived effectiveness of preventive actions, can explain this insignificant interaction outcome. We can state that age do not moderate the effect of risk perception (probability, severity, controllability) on perceived effectiveness of preventive actions.

Perception of hospital risk varies according to the characteristics of healthcare workers (gender, accident experience, severity of accident, years of work experience, level of study, hospital type)

Female HCWs perceive more the probability of risk than their male colleagues

Studies on risk perception and gender establish that men perceive less risk than women (Cutter et al., 1992; Gustafson, 1997; Rhodes & Pivik, 2011). We observe a difference in perceived probability of risk based on gender. Particularly, our results established that female HCWs perceive more the likelihood of hospital risks than do their male counterparts. This is in line with the findings on the variation in perceived risk likelihood and gender by McCool et al. (2009) and Gletty (2017). These authors established that perception of the vulnerability of risk is higher among women. There is need to explore more on this relationship to understand why female HCWs perceive more risk than men. Conversely, there was no observed difference in the perceived severity and controllability of hospital risks by gender. These results show that perceiving the controllability and severity of hospital risk can be recognizable irrespective of gender.

Hospital accident experience among HCWs is linked with high perceived risk probability and severity and not with perceived controllability

Accident experience has been found to relate with high perception of risk probability (Kouabenan et al., 2003; Kouabenan, 2002; Kung & Chen, 2012; Leiter 2011). This was confirmed in our analysis which reveal that being a victim of hospital accident increases one's perceived risk probability and perceived severity of risk. Indeed, being a victim of accident can make an individual to have an unbiased interpretation of the reality about risk. Moreover, the degree of the severity of the accident experienced,

explains more the link between accident experience and perceived risk probability. This means that the more serious the accident experienced, the more the individual perceives high the probability of accident.

Severity of hospital accident among HCWs is linked with high perceived risk probability and severity and not with perceived controllability

We find that HCWs who have severe injury perceive more the probability and severity of hospital accident compared to light injury or no injury group. This was contrary to the findings of some authors (Ngueutsa, 2012; Ngeutsa & Kouabenan, 2017; Gletty, 2017) that victims of serious accidents underestimate risk. Basically, the link between HCWs accident experience and high perceived probability and severity of risk can be explained by their elevated perception about the seriousness of the consequences of hospital work risks.

Healthcare workers perceive more the probability of risk based on their years of work experience

Our results show that the longer the HCWs spend on their job, the more they perceive the likelihood of hospital risk. This was also the case in the study on road risk perception and work experience by Kouabenan (2002). People who have spent more years in their driving occupation, fear more the risks on the road than people with less experience and inactive drivers. We did not observe any variation in perceived risk severity and perceived risk controllability.

Perceiving the severity of hospital risk is linked with level of study

Healthcare workers perceived severity of hospital risks was found to differ significantly with level of education. The higher they acquire knowledge the more they recognize the severity of hospital risk. This corroborates with the findings of Rattay et al. (2021). They established that perceived risk severity associated with COVID-19 is linked with level of education. Therefore, acquiring more knowledge improves an individuals' understanding of the risk associated with hospital work.

Perception of risk probability, severity and controllability differs based on hospital type

The nature of hospital where HCWs work influences their risk perception. We found that HCWs in public hospitals have higher perceived risk probability, higher perceived risk severity and higher perceived risk controllability than those in private hospitals. With the naive observation of the activities in public and private hospitals, it is seen that public hospitals have many patients with different forms of ailments that ranges from simple to complicated ailments compared to private hospitals. Moreover, difficult conditions are mostly referred to public hospitals by the private hospitals. Additionally, public hospitals are well known with emergency units and different specialist units like tuberculosis and HIV clinic etc. Therefore, healthcare workers in public hospitals perceive more the controllability of hospital work risks than healthcare workers in private hospital. Indeed, the type of hospital is a determinant of the level of risk a HCW perceives.

Conclusion

Our findings reveal that risk perception is an important element that influences health workers safety behaviour and their perception of preventive actions. These findings

are vital in strengthening risk assessment and suggests strategies for improving preventive actions in Nigerian hospitals. Specifically, among the three characteristics of risk studied, perceived risk severity significantly predicts HCWs safety behaviour. This suggests that emphasis on the seriousness of risk consequences should be considered imperative among HCWs in Nigerian hospitals. Based on this, risk and safety awareness campaigns can be designed to get these messages across to HCWs on the severity of risks and safety tips. Moreover, we suggest that these health campaigns should incorporate the objectives to improve health care workers knowledge on the adverse effects of the risks attached to their work, and the importance of following safety protocols. We can refer to our interview results obtained with HCWs on what should be considered a priority in curbing accidents in the hospital (see chapter 6). Their major responses were organizing trainings and health sensitization programs. This shows that HCWs recognizes the effectiveness of safety and health sensitization programs. Therefore, it is vital to create a wholistic awareness programs that will constantly remind workers of the seriousness of risk in their workplace and the need to follow safety precautions. By wholistic awareness program we mean a program that will incorporate multiple activities in passing information to workers, which can also be extended to the public. It is important to adapt these programs to what HCWs perceive to work for them because it can improve their acceptance and involvement in safety actions.

The recommendations on how to boost safety behaviour of healthcare workers through improving their risk perceptions should target the entire population of HCWs for a better safety outcome. However, variability in risk perceptions were better explained by some individual characteristics that were studied. Outstanding individual characteristics should be considered priority in delivering safety messages to boost preventive measures.

For instance, men were found to perceive less the probability of risk than women. Thus, management should ensure that men are well represented in risk and safety campaigns. This will help to enhance their consciousness and knowledge that risk at work is not gender based but rather should be the concern of every worker irrespective of gender. Moreover, people who have never become a victim of accident perceive less the probability and severity of risks. Therefore, it can be more influential to give accident victims the opportunity to contribute to trainings and sensitization programs letting others to learn from their experience, the severity of being involved in work accidents. This life experience testimonies can improve HCWs risk perception about risks and the need to be involved in safety behaviour. Another important finding is that HCWs who have advanced in their number of years at work perceive more the probability of risk than early career health workers. We suggest that more experienced workers should act as resource persons in health and safety trainings.

In the next chapter 10, we will see the role of beliefs on risk perception and naive causal explanation of accident. This is noted in the research by Kouabenan (1999, 2003) that beliefs play a crucial role on individuals' causal explanations and risk perception. We will also see the link between risk perception and naive causal explanations of accidents.

Chapter 10: Beliefs, naive causal explanations, risk perception and safety behaviour: testing for mediating effects

Introduction

The findings of the previous chapters have enriched our knowledge on the influence of beliefs, naive explanations of accident and risk perception on safety behaviour. We observed that fatalistic beliefs are negatively associated with safety behaviour while perceived risk severity have positive influence on safety behaviour. We also found that internal and external causal explanations are important factors in safety behaviour and perceived effectiveness of preventive actions among healthcare workers. Interestingly, Kouabenan (1999, 2003) noted that individual socio-cultural factors such as beliefs, play an important role on causal explanations and risk perception. This was demonstrated in the study by Ngueutsa and Kouabenan (2017) on the role of beliefs on risk perception and its indirect effect on safety behaviour. Based on these concepts, we aim to understand the relationship between these study factors and their mediation effect on safety behaviour.

Therefore, the global objective of this chapter is to understand the relationship between fatalistic beliefs, control beliefs, normative beliefs, perceived risk probability, perceived risk severity, perceived risk controllability, internal and external causal explanations and safety behaviour. In the next headings, we will state the problem and the hypotheses of the chapter, the methodology, the principal analysis and end with the discussion of the findings and the conclusion.

1. Problem and hypotheses

Fatalism has been found to be a determining factor in causal explanations of accident. For instance, studies by several authors (Kouabenan, 2013; Ngueutsa, 2012; Patwary et al., 2012; Peltzer & Renner, 2003) show that fatalistic beliefs are positively linked to external explanations of accidents. This means that when individuals believe that accidents are predetermined and uncontrollable, they tend to attribute accident causes to external factors outside their control. Following the work of Patwary et al. (2012), fatalistic individuals are more likely to provide causal explanations that portray their inability to control accidents, thereby giving explanations that favor situational or external factors than non-fatalists. This form of explanation is believed to negatively affect the safety behaviour of fatalists compared to non-fatalists. This is also the case with the study by Kouabenan (1998) on how fatalistic individuals explain accidents. Kouabenan found that fatalistic individuals give causal explanations that implicate external factors which they believe are not under their control. Also, McIlroy et al. (2020) state that the positive relationship between fatalistic beliefs and external causal explanations leads to unsafe behaviour. Based on these findings, we will hypothesize that healthcare workers who have high fatalistic beliefs will give more external causal explanations than non-fatalists (**H32**). Additionally, we propose that the effect of fatalistic beliefs on safety behaviour will be mediated by external causal explanations of accidents (**H33**). This means that fatalistic beliefs will have an indirect effect on safety behaviour through external causal explanations of accidents.

Moreover, it will be of interest to test the role of control beliefs on healthcare workers' causal explanations of accidents and how these in turn affect their behaviour of

safety towards occupational risk. According to authors like Lefcourt and Davidson (1991); Kouabenan (2013) and Gletty (2017), individuals who have the perceived capacity to handle events are more likely to explain accidents by dispositional factors and more probable to engage in safety behaviour. In other words, overestimation of one's own skills leads to attributing accident causes less to situational factors. Example, Gletty (2017) find that board sports practitioners who believe in their capacity to manage off-piste avalanche risk, give more internal explanations to victims of avalanche than those with lesser control beliefs. In this case, we propose that HCWs with stronger believe in their capacity to handle hospital work risks, will explain accidents more by internal factors than those who have low perceived control (**H34**). Furthermore, examining how internal explanation mediates the effect of control beliefs on safety behaviour will be of importance to the study. According to Lefcourt et al. (1991), interaction between internal causal explanation and control beliefs leads to safety behaviour. These findings were also recorded in the work by Boua (2021) and Ngueutsa (2012), which show that internal causal explanation can mediate the effect of control beliefs on safety behaviour. On this basis, we expect that internal explanation of accidents will mediate the role of control beliefs on safety behaviour of HCWs (**H35**).

We are also interested in the relationship between normative beliefs and causal explanations. Let's note that there is lack of studies on the link between normative beliefs and internal causal explanation. Nonetheless, Dubois (1988) tries to distinguish this effect on secondary school pupil. She saw that when normative pressure is low among school children, their acceptance for personal responsibilities tends to be weaker. We will predict that normative beliefs will positively predict internal causal explanation (**H36**). Moreover, it will be interesting to see the mediating role of internal causal explanation on

effect of normative beliefs on safety behaviour has not been proved in the literature. We will therefore predict that the link between normative beliefs and safety behaviour will be mediated by internal causal explanation (**H37**).

Furthermore, beliefs are one of the key factors that influences risk perception of individuals (Kouabenan, 2006d). Several authors found that fatalistic beliefs lead to underestimation of risk (Ngueutsa & Kouabenan, 2017; Norenzayan & Lee, 2010; Simsekoglu et al., 2013). This mean that people who possesses fatalistic beliefs are likely to under evaluate the danger of the hazards present in their environment, since it is not in their power to change any situation. Moreover, fatalistic beliefs are seen to negatively influence safety behaviour (Kouabenan, 1998; Mayer & Smith, 2019; Rundmo & Hale, 2003; Ugwu et al., 2015). In essence, high fatalistic beliefs will lead one to undervalue risk and engage in unsafe behaviour (Ngueutsa & Kouabenan, 2017). We will propose that healthcare workers who have high fatalistic beliefs will tend to have low perceived risk probability (**H38a**), low perceived risk severity (**H38b**) and low perceived risk controllability (**H38c**). We will also hypothesize that the effect of fatalistic beliefs on safety behaviour will be mediated by perceived risk probability (**H39a**), perceived risk severity (**H39b**) and perceived risk controllability (**H39c**). This signifies that the effect of fatalistic beliefs on safety behaviors will depend on risk perception.

Besides, perceived control also referred to as control beliefs can play a role on risk perception. This form of belief is characterized by overconfidence in ones' ability to take actions in the face of threat (Bandura, 1977; Kouabenan, 2006b) and has been linked with unsafe behaviour (Boua, 2021; Ngueutsa, 2012; Ulleberg, 2002). Interestingly, studies have shown that high control beliefs lead to underestimation of risks (Chaurand & Delhomme, 2013; Puchades et al., 2018). Indeed, it is possible that overestimation of

the capability to handle risk can lead individuals to underestimate risk likelihood and risk severity (Chaurand & Delhomme, 2013). This mean that overconfidence in one's capacity to handle risk can diminish the one's perceived threat from the risks in one's environment. Therefore, we will expect that healthcare workers who have a high control beliefs will have low perceived risk probability (**H40a**) and low perceived risk severity (**H40b**) and a high perceived risk controllability (**H40c**). Moreover, we predict that the effect of control beliefs on safety behaviour will be mediated by perceived risk controllability (**H41a**), perceived risk severity (**H41b**) and perceived received risk controllability (**H41c**).

Apart from control beliefs, normative beliefs can also determine risk perception. Although the effect of normative beliefs on the perception of risk, has not been widely studied, especially in the health domain. Nevertheless, fewer studies have identified that a person's perceived behavioural expectations of important others are positively related with high perception of risk. Example, Page et al. (2012), showed that normative beliefs in smoking activities is significantly correlated with perceived risk susceptibility. Moreover, studies on normative beliefs show that it is positively linked with safety behaviour. This is observed in behaviour of safety in handling food (Lin & Roberts, 2020; Milton & Mullan, 2012; Mullan & Wong, 2009), engaging in health practices (Motalebi et al., 2014), safe driving behaviour (Olejniczak-Serowiec & Rutkowska, 2018; Parker, 2002) and engagement in work safe behaviour (Javadi et al., 2013). These studies suggest that safety behaviour can be improved by considering a person's perceived behavioural expectations of important others that influences their decision to comply (Nigg et al., 2009). Based on these findings, we will hypothesize that normative beliefs will be positively related with perception of risk probability (**H42a**), perceived risk severity

(H42b) and perceived risk controllability (H42c). Also, we will predict that the effect of normative beliefs on safety behaviour will be mediated by perceived risk probability (H43a), perceived risk severity (H43b) and perceived risk controllability (H43c).

Interestingly, the way people explain accident situations may be influenced by their perception and assessment of the risk surrounding the event (Kouabenan 2002; Mannetti, & Pierro, 1991; Rickard, 2014). Literature on risk and accident evaluation, has shown that individuals vary in their explanation of accident based on their risk perception. This is evident among professionals and laypeople who mostly have varying perceptions of risks and the causes of accidents (Kouabenan, 2002). We will note that risk perception precedes causal explanation and as such these two socio-psychological factors cannot be distinguished from each other (Ngueutsa, 2012). Moreover, there are lack of studies on the joint influence of risk perception and causal explanations and in few cases, these concepts are studied indirectly or in interaction with other factors (Ngueutsa, 2012).

Rickard (2014) study with 447 park visitors on perception of risk and the attribution of responsibility for accidents revealed that respondents who perceive park-related risks as controllable, were more likely to attribute accident causes to the victim. The outcome of his study showed that there is a positive significant link that exists between risk perception and internal causal attribution. In general, Rickard (2014) found a negative relationship between perceived risk controllability and external causal explanation while a positive correlation exists between perceived controllability of risk and internal explanation of accident causes. An interaction link between risk perception, causal explanation and safety behaviour shows that even though a risk is perceived as high, causal responsibility was attributed to external factor which is directed to the management and the eagerness to take precautionary action is less. In addition, Nees,

Shama and Shore (2020) study on the influence of causal attributions to human error and perceived risk, show a positive significant relationship between causal explanation and risk perception. The responses of 971 online participants shows that attributions of accident cause to people's mistake are indicative to people who perceive risks from human error as more preventable.

This is to say that when surrounding risks are perceived as controllable, events will be explained by human factors. In summary, the insights drawn from the studies on perception of risk and naive explanations of accidents shows that causal attributions given by people can be influenced by their risk perception (Kouabenan, 2005). Indeed, we will assume that HCWs who have high perceived risk probability (**H44a**), perceived risk severity (**H44b**) and perceived risk controllability (**H44c**) will tend to explain accident by internal causal explanations. Moreover, it is considered that the influence of risk perception on safety behaviour can be mediated by causal explanations (Ngueutsa, 2012). We therefore expect that the effect of risk perceptions on safety behaviour will be mediated by internal causal explanations. Accordingly, the effect of perceived risk probability on safety behaviour will be mediated by internal causal explanations (**H45a**). Also, the influence of perceived severity of hospital risk on safety behaviour will be mediated by internal causal explanations of accidents (**H45b**). Finally, we expect a mediation effect of perceived risk controllability on safety behaviour by internal causal explanations of accident (**H46c**). Generally, this means that the effect of risk perception on safety behaviour depends on internal causal explanation of accident.

2. Methodology

The methodology adapted in this chapter involves the same participants, the same measuring scales: for beliefs (fatalistic, control, normative), causal explanations, risk perception and safety behaviour and the same study procedure as described and validated in chapters 7, 8, and 9. Thus, we do not need to repeat these processes in this chapter.

3. Results

3.1. Procedure for analyzing the results

Direct relationship between beliefs and naive causal explanation of accident and between risk perception and naive causal explanations were analyzed using internality score of the responses of the naive causal explanation of hospital work accident. A positive internality score indicates internal causal explanation while a negative internality score shows external causal explanation of accident. To carry out mediation analysis, hypotheses were analyzed with Macro-PROCESS (Hayes, 2013; Preacher & Hayes, 2004,). This process has a four-path analysis (a, b, c, c') that represents 1) path (a) which indicates the relationship between the predictor variable and the mediator variable (MV); 2) path (b) is the relationship between the MV and the outcome variable; (3) path (c) the relationship between the independent variable and dependent variable and 4) the final path represented by (c') indicates the indirect effect of the IV on the DV through the MV. To detect if there is an indirect mediation, the effect of the independent (IV) on the MV and the effect of the MV on the DV must be significant. Notwithstanding, these significant paths do not detect the level of significance either by P value or through the confidence interval (Yzerbyt et al., 2018). In this case, we consider calculating the

confidence interval and the P- value to establish the significance level. According to Fritz, and MacKinnon (2007), a confidence interval that does not include zero indicates a significant indirect effect. Moreover, we also used the Sobel (1982) test to calculate the P-value, to confirm the significance level of the indirect effect. Other types of mediation outcome include, a partial mediation effect considered to have occurred when the effect of the IV on the DV is reduced with the presence of the MV. This simply means that the value of (c') is lesser than the value of (c) and remains significant. A full mediation occurs when the presence of the MV makes the effect of the IV on DV insignificant.

3.2. Relationship between the measurement scales of beliefs, naive explanations of hospital accidents, risk perception and safety behaviour

Table 26 shows the correlation analysis between the variables of study with the means and standard deviations. The values in the table 26 shows that the variables proposed in the direct and mediation analysis are all significantly correlated with each other. On the contrary, the link between fatalistic beliefs and perceived risk probability ($r = .06, p = .13$), perceived risk severity ($r = .04, p = .37$) and perceived risk controllability ($r = -.06, p < .17$) are not significant.

Table 26

Descriptive statistics and inter-correlational analysis among variables of study: Beliefs, naive explanations of accident, risk perception and safety behaviour

Variables	M	SD	1	2	3	4	5	6	7	8	9	10
Fatalistic beliefs	1.63	.57	1									
Control beliefs	3.54	.65	.01	1								
Normative beliefs	6.08	1.22	-.03	.20**	1							
Perceived risk probability	2.79	.95	.06	.06	.13**	1						
Perceived risk severity	3.61	1.05	-.04	.19**	.14**	.44**	1					
Perceived risk controllability	3.51	.93	.06	.31**	.08	.06	.43**	1				
Internal explanation	3.78	.77	-.11**	.25**	.25**	.24**	.41**	.34**	1			
External explanation	4.09	.82	-.19**	.21**	.21**	.07	.29**	.31**	.73**	1		
Internality score	-0.32	.59	.13**	-.02	.04	.22**	.13**	.01	.29**	.44**	1	
Safety behaviour	3.49	.52	-.16**	.03	.00	.06	.10**	-.00	.06	.05	.02	1

3.3. Verification of hypotheses

3.3.1. Mediation effect of beliefs (fatalistic, controlling, normative)

on safety behavior through naive explanations of accidents

In this section, we analyzed the direct effect of beliefs on causal explanations of accident and the mediation of the effect of beliefs on safety behaviour through naive causal explanations.

3.3.1.1. Fatalistic beliefs naive explanations and safety behaviour

Link between fatalistic beliefs and causal explanations of accident

To test the relationship between fatalism and causal explanations, our hypothesis (**H32**) proposes that workers give more external causal explanation when they are fatalists than non-fatalists. In this case, fatalistic beliefs are the independent variable (IV) while the external causal explanation is the dependent variable (DV). The internality score of the naive causal explanation is positively related with fatalistic beliefs, $b = 0.13$, $R^2 = 0.03$, $t(611) = 3.19$, CI 95% [0.05, 0.22], $p = .001$. This result is contrary to our hypothesis **H32** that fatalists' healthcare workers will explain accident by external factors.

Mediating effect of external causal explanations on the effect of fatalistic beliefs on safety behaviors

In this part, we first proposed a mediation that the effect of fatalistic beliefs on safety behaviour will be mediated by external causal explanations of accidents (**H33**) since fatalistic beliefs is expected to be related with external causal explanations. The outcome of the mediation analysis is not significant, indicating that the effect of fatalism on safety behaviour is not mediated through the external causal explanations of accidents. Precisely, fatalistic beliefs negatively and significantly predict external causal explanations ($b = -0.28$, $t(611) = -4.82$, $p = .001$). The link between external causal explanations and safety behaviour was not significant, ($b = 0.01$, $t(611) = 0.39$, $p = .69$). The indirect effect of fatalism on safety behaviour was not significant ($b = -0.00$, 95% CI [-0.02, 0.01], $p = .69$). Therefore, our hypothesis **H33** is not confirmed.

3.3.1.2. Control beliefs, naive explanations and safety behaviour

Relationship between control beliefs and causal explanations of accident

The regression analysis of control beliefs and the internality score of naive causal explanation showed no significant relationship between control beliefs and naive causal explanations of accidents $b = -.03$, $R^2 = 0.00$, $t(611) = -.68$, IC 95% [-0.09, 0.05], $p = .49$. Therefore, our hypothesis that control beliefs will predict internal causal explanation is not confirmed (**H34**).

Mediating effect of internal causal explanations on the effect of control beliefs on safety behaviors

Here, we expect that internal explanation of accidents will mediate the role of control beliefs on safety behaviour (**H35**). The outcome of the analysis as shown in figure 48 indicates a non-significant mediation effect of control beliefs on safety behaviour through the internal causal explanations of accidents. Control beliefs significantly predict internal causal explanations ($b = 0.30$, $t(611) = 6.28$, $p = .001$). Internal causal explanation has no significant link with safety behaviour ($b = 0.04$, $t(611) = 1.30$, $p = .19$), the indirect effect of control beliefs on safety behaviour is not significant with the presence of the internal causal, ($b = 0.01$, CI 95% [-0.01, 0.03], $P = .20$). This indicates that internal causal explanation has a positive trend mediation effect of control beliefs on safety behaviour.

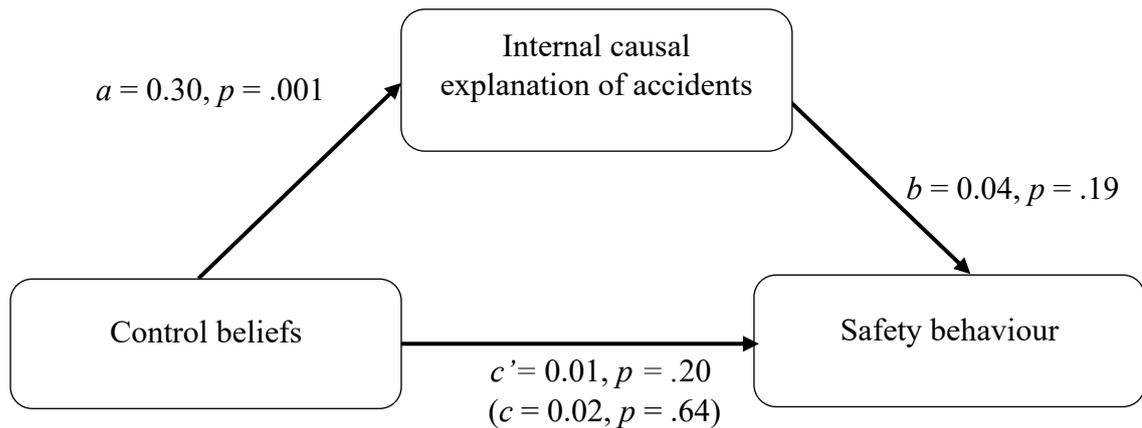


Figure 48: Indirect mediation of the effect of normative beliefs on safety behaviour by internal causal explanations.

3.3.1.3. Normative beliefs, naive explanations and safety behaviour

Relationship between normative beliefs and causal explanations of accident

Also, we test the hypothesis that HCWs who have high beliefs in behavioural expectations of referent others, will provide more internal causal explanations (**H36**). The result of the regression analysis between normative beliefs and causal explanations, $b = .05$, $R^2 = 0.01$, $t(611) = 1.09$, IC 95% [-0.02, 0.06], $p = .28$ is not significant. Therefore, our hypothesis **H36** is not confirmed.

Mediating effect of normative beliefs on safety behaviors by internal causal explanations of accident

Here, we propose to observe if the link between normative beliefs and safety behaviour will be mediated by internal causal explanations (**H37**). From figure 49, we can see that internal explanations mediates the effect of normative belief on safety behaviour. The effect of normative belief on internal explanation is significant $b = .15$, t

(611) = 5.71, $p = .001$. The link between internal explanations and on safety behaviour is not significant $b = 0.04$, $t(611) = 1.29$, $p = .19$. Also, the indirect effect of normative belief on safety behaviour is not significant, $b = 0.01$, $[-0.01, 0.03]$, $p = .21$. This result does not confirm our hypothesis **H37** which indicate that health workers who accept to behave according to the behavioural expectations of referent persons are likely to provide internal explanation of accidents and will engage in safety behaviour.

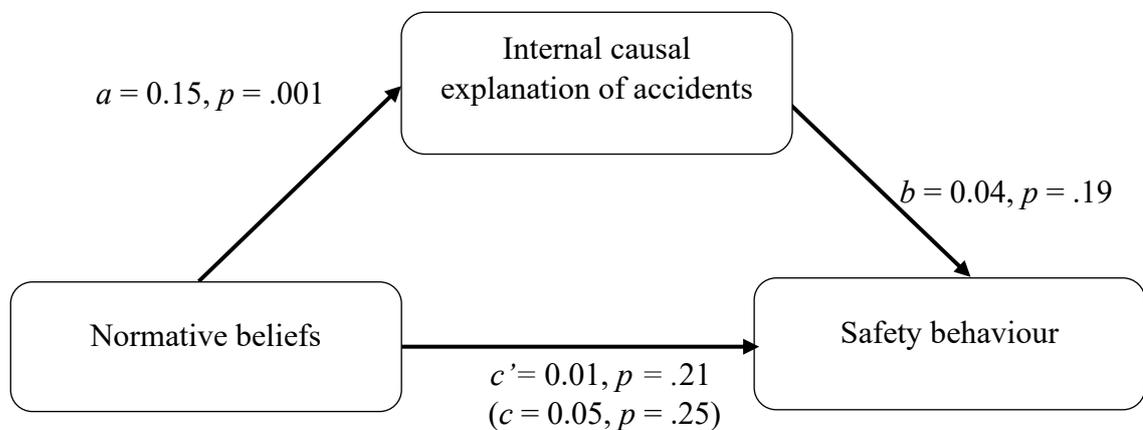


Figure 49: Indirect mediation of the effect of normative beliefs on safety behaviour by internal causal explanations.

3.3.2. Analysis of the mediation of the effect of beliefs (fatalistic, control, normative) on safety behavior through risk perception

This section is focused on the relationship between beliefs and risk perception and the mediating role of risk perception on the effect of beliefs on safety behaviour.

3.3.2.1. Fatalistic beliefs, risk perception and safety behaviour

Link between fatalistic beliefs and risk perception

The result of the regression analysis show non-significant relationship between fatalistic beliefs and perceived risk probability, $b = 0.06$, $R^2 = 0.03$, $t(611) = 1.49$, IC 95% [-0.03, 0.23], $p = .14$; perceived risk severity, $b = -0.03$, $R^2 = 0.00$, $t(606) = -0.80$, IC 95% [-0.21, 0.09], $p = .43$; and perceived risk controllability, $b = 0.05$, $R^2 = 0.00$, $t(606) = 1.30$, IC 95% [-0.05, 0.22], $p = .20$. Therefore, our assumptions **H38a**, **H38b** and **H38c** that fatalistic beliefs will negatively correlate with risk perception were not significant.

Mediating effect of fatalistic beliefs on safety behaviors by risk perceptions

First, we proposed that the effect of fatalistic beliefs on safety behaviour can be mediated by perceived risk vulnerability (**H39a**), perceived severity of risk (**H39b**) and perceived risk controllability (**H39c**). The results show no significant indirect effect of fatalistic beliefs on safety behaviour. Therefore, our hypotheses **H39a**, **H39b** and **H39c** were not confirmed. Precisely, the link between perceived risk probability and fatalistic beliefs is not significant ($b = 0.10$, $t(611) = 1.51$, $p = .13$). Also, the effect of perceived risk probability on safety is not significant ($b = 0.03$, $t(611) = 1.50$, $p = .13$). Additionally, the indirect effect of fatalistic beliefs on safety behaviour is not significant ($b = 0.00$, 95% CI [-0.00, 0.01], $P = .29$). This result did not confirm our hypothesis **H39a**.

We also recorded non-significant mediation effect of fatalistic beliefs on safety by perceived risk severity. The result show that the link between fatalistic beliefs and risk perception severity is insignificant ($b = -0.07$, $t(611) = -0.89$, $p = .37$). On the other hand, the effect of risk perception severity on safety behaviour is significant ($b = 0.04$, $t(611)$

= 2.27, $p = .024$). Moreover, the indirect effect is not significant with a value of ($b = -0.00$, 95% CI [-0.01, 0.03], $P = .41$). This result did not verify our hypothesis **H39b**.

The mediation effect of fatalistic beliefs on safety behaviour by perceived risk controllability is not significant. The link between fatalistic beliefs and perceived risk controllability is not significant ($b = 0.09$, $t(611) = 1.38$, $p = .17$). Next, the effect of perceived risk controllability on safety behaviour is not significant ($b = 0.02$, $t(611) = 0.87$, $p = .39$) and the indirect effect is not significant with value ($b = 0.00$, 95% CI [-0.00, 0.01], $p = .46$). This result did not confirm to our hypothesis **H39c**.

3.3.2.2. Control beliefs, risk perception and safety behaviour

Link between control beliefs and risk perception

Our analysis showed a non-significant link between control beliefs and perceived risk probability, $b = 0.06$, $R^2 = 0.03$, $t(611) = 1.42$, IC 95% [-0.03, 0.20], $p = .16$. Moreover, we observed a positive and statistically significant relation between control beliefs and perceived risk severity, $b = 0.20$, $R^2 = 0.06$, $t(611) = 7.60$, IC 95% [0.15, 0.26], $p = .001$. Also, the link between control beliefs and perceived risk controllability is positive and statistically significant, $b = 0.31$, $R^2 = 0.29$, $t(611) = 7.94$, IC 95% [0.33, 0.55], $p = .001$. Therefore, hypothesis **H40a** was not confirmed, while hypothesis **H40b** was contrary to our assumption that high control beliefs will be linked with low perceived risk severity. Moreover, perceived control is positively and significantly related with perceived risk severity. Hypothesis **H40c** was also confirmed and in-line with our assumption that the more healthcare workers believe they possess the capacity to handle work risk, the more they perceive that hospital risks are controllable.

Mediating effect of control beliefs on safety behavior by risk perception

Here we observe the indirect mediation effect of control beliefs on safety behaviour by perceived risk likelihood (**H41a**), perceived severity of risk (**H41b**) and perceived risk controllability (**H41c**). Our result showed non-significant mediation effect of control beliefs on safety behaviour by perceived risk probability. Specifically, the link between control beliefs and perceived risk probability is not significant ($b = 0.09$, $t(611) = 1.48$, $p = .14$). Also, the effect of perceived risk probability on safety behaviour is not significant ($b = 0.03$, $t(611) = 1.19$, $p = .23$). The indirect effect is equally insignificant with value ($b = 0.00$, 95% CI [-0.00, 0.01], $P = .35$). Hypothesis **H41a** was not confirmed.

For our hypothesis **H41b**, we see from figure 50 that the effect of control beliefs on safety behaviour is mediated by perceived risk severity. We recorded a significant effect of control beliefs on risk perception severity ($b = 0.30$, $t(611) = 4.64$, $p = .001$), and a significant effect of perceived risk severity on safety behaviour ($b = 0.05$, $t(611) = 2.29$, $p = .022$). The indirect effect of control beliefs on safety behaviour is significant, $b = 0.01$, 95% CI [0.001, 0.028], $P = .04$). This result is in line with our hypothesis **H41b** that healthcare workers who have a strong control belief tend to perceive higher risk perception severity and likely to engage in safety behaviour.

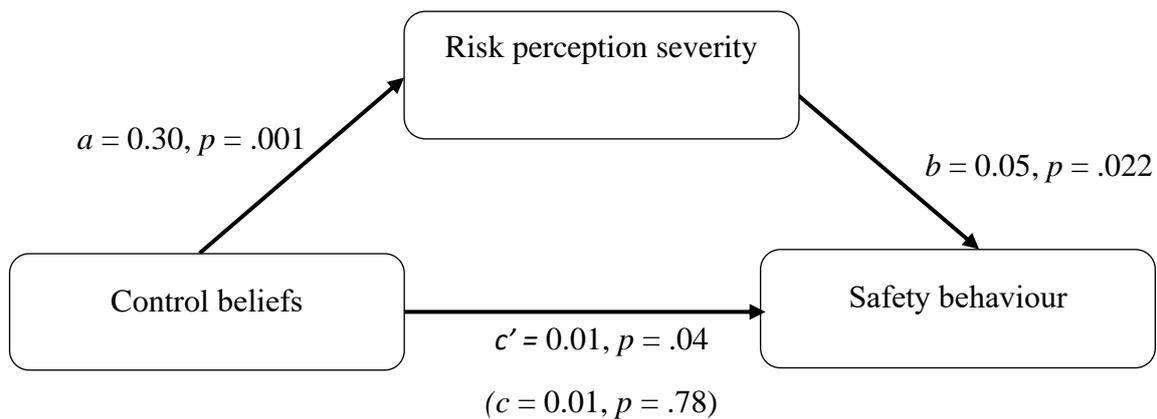


Figure 50: Indirect mediation of the effect of control beliefs on safety behaviour

On the other hand, we did not record a significant mediation of control beliefs on safety behaviour by perceived risk controllability. Precisely, the result show that the link between control beliefs and perceived risk controllability is significant ($b = 0.44$, $t(611) = 7.93$, $p = .001$). All the same, the link between perceived risk controllability and safety behaviour is not significant ($b = -0.00$, $t(611) = -0.43$, $p = .67$). The indirect effect is not significant ($b = 0.00$, 95% CI [-0.02, 0.02], $P = .67$). This result does not confirm our hypotheses **H41c**.

3.3.2.3. Normative beliefs, risk perception and safety behaviour

Relationship between normative beliefs and risk perception

Our findings indicate that normative beliefs are positively and statistically significant with perceived risk probability, $b = 0.13$, $R^2 = 0.07$, $t(611) = 3.14$, IC 95% [0.04, 0.16], $p = .002$. Normative beliefs are also positively and significantly linked with perception of risk severity, $b = 0.14$, $R^2 = 0.06$, $t(611) = 3.52$, IC 95% [0.05, 0.19], $p = .001$. On the other hand, there is a trend relationship between normative beliefs and

perceived risk controllability, $b = 0.07$, $R^2 = 0.00$, $t(611) = 1.80$, IC 95% [-0.01, 0.12], $p = .07$. Hypotheses **H42a** and **H42b** were confirmed showing that healthcare workers that have high normative beliefs tends to perceive the likelihood and severity of risk. Moreover, Hypothesis **H42c** shows a trend effect indicating that HCWs who are high in normative beliefs are likely to have high perceived controllability of risk.

Mediating effect of normative beliefs on safety behaviors by risk perceptions

We expect the effect of normative beliefs on safety behaviors to be mediated by perceived susceptibility of risk (**H43a**) and perceived risk severity (**H43b**). The result of the mediation effect of normative beliefs on safety behaviour by perceived risk probability is not significant. We see that the link between normative beliefs and perceived risk probability is significant ($b = 0.10$, $t(611) = 3.25$, $p = .001$). Conversely, the link between perceived risk probability and safety behaviour is not significant ($b = 0.03$, $t(611) = 1.14$, $p = .25$). In addition, indirect effect of normative belief on safety behaviour by perceived risk probability is not significant ($b = 0.00$, [-0.00, 0.01], $P = .28$). This result did not confirm our hypothesis, **H43a**.

Figure 51 show that the effect of normative beliefs on safety behaviour is mediated by perceived risk severity. The result show that the link between control beliefs and perceived risk severity is significant ($b = 0.12$, $t(611) = 3.67$, $p = .001$). Also, there is a significant effect of perceived risk severity on safety behaviour ($b = 0.05$, $t(611) = 2.31$, $p = .022$). In addition, the indirect effect of normative beliefs on safety behaviour is trend ($b = 0.01$, 95% CI [0.001, 0.029], $P = .051$). This result is in line with our hypothesis **H43b** that healthcare workers who have a strong control belief tend to perceive higher risk perception severity and likely to engage in safety behaviour.

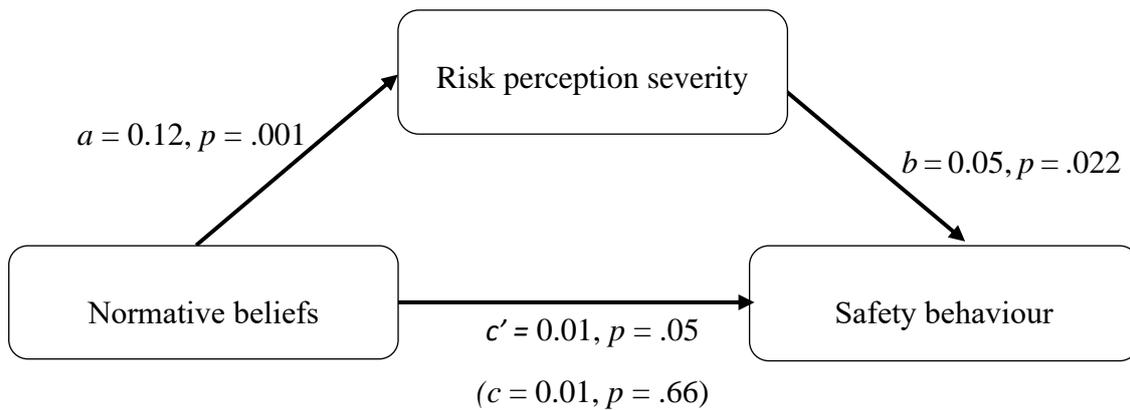


Figure 51: Indirect mediation of the effect of normative beliefs on safety behaviour by perceived risk severity

3.2.3. Analysis of the mediation of the effect of risk perception on safety behavior through naive explanations of accidents

This section focuses on the relationship between risk perception and causal explanation of accident and the mediation of the effect of risk perception on safety behaviour by causal explanation of accident.

Relationship between risk perception and causal explanations

The regression analysis of the internality score of the naive causal explanation and perceived risk probability is significantly positive, $b = 0.21$, $R^2 = 0.12$, $t(607) = 5.29$, 95% CI [0.08, 0.18], $p = .001$. This confirms our hypothesis **H44a** that perceiving the likelihood of hospital risk will be linked with internal causal explanations. Also, there is significant relationship between perceived risk severity and naive causal explanation, $b = 0.12$, $R^2 = 0.05$, $t(607) = 3.08$, 95% CI [0.03, 0.11], $p = .002$. This means that the more hospital risks are perceived as severe the more the role of healthcare workers are cited in explaining hospital work accident. This confirms our hypothesis **H44b**. On the other

hand, there is no significant relationship between perceived risk controllability and naïve causal explanations, $b = 0.01$, $R^2 = 0.01$, $t(611) = 0.15$, 95% CI [-0.05, 0.05], $p = .88$. Therefore, hypothesis **H44c** is not confirmed.

Mediation effect of risk perception on safety behaviour by causal explanations

We expect that the effect of perceived risk probability on safety behaviour will be mediated by internal causal explanations (**H45a**). The Haye's process show that internal causal explanations do not mediate the effect of perceived probability of risk on safety behaviour. Precisely, although the effect of risk perception probability on internal causal explanations of accident is significant ($b = 0.14$, $t(611) = 4.07$, $p = .001$), the effect of the internal causal explanation on safety behaviour is not significant ($b = 0.03$, $t(611) = 1.25$, $p = .21$). Additionally, the indirect effect of risk perception probability on safety behaviour is not significant, ($b = 0.00$, [-0.00, 0.03], $P = .23$). This result did not confirm our hypothesis, **H45a**.

Moreover, the results do not justify our hypothesis **H45b** which predicts a mediation between perceived severity of risk and safety behaviour through internal causal explanations. Specifically, the effect of perceived severity of risk on internal causal explanation is significant ($b = 0.23$, $t(611) = 7.79$, $p = .001$), but the effect of internal explanation of accident on safety behaviour is not ($b = 0.02$, $t(611) = 0.75$, $p = .45$). In addition, the indirect effect is not significant ($b = 0.00$, 95% CI [-0.01, 0.02], $p = .46$).

Furthermore, the results in figure 52 show that the mediation of the effect of perceived controllability of risk on safety behaviour by internal causal explanation is not significant. Specifically, the link between the perceived risk controllability and internal explanation of accident is significant ($b = 0.24$, $t(611) = 7.26$, $p = .001$). Also, the effect

of internal explanation of accident on safety behaviour is not significant ($b = 0.04$, $t(611) = 1.31$, $p = .19$). In addition, the indirect effect is not significant ($b = 0.01$, 95% CI [-0.00, 0.02], $P = .20$). These results do not confirm our hypothesis **H45c**.

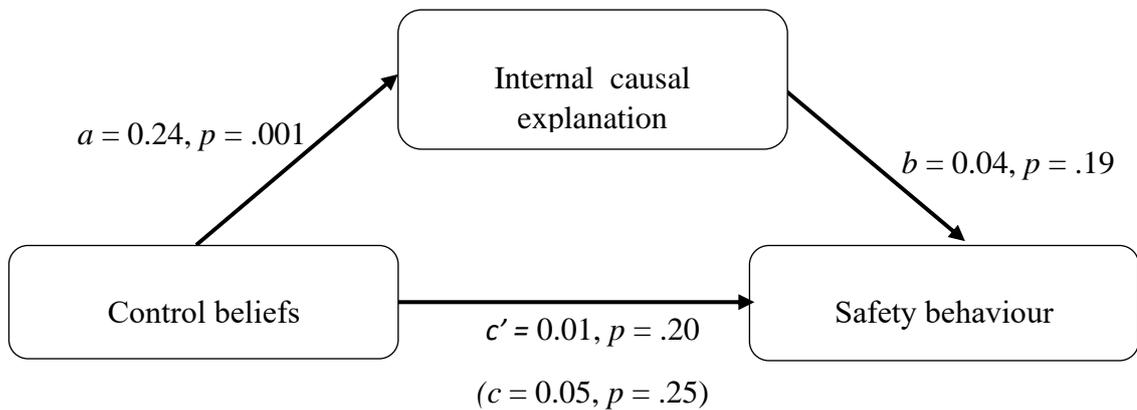


Figure 52: Indirect mediation of the effect of control beliefs on safety behaviour by internal causal explanations

4. Discussion

The results obtained in this chapter are interesting and practical. These results sheds light on 1) the impact of beliefs on naive explanations of accidents and the mediation effect of causal explanations on the effect of beliefs on safety behaviour, 2) the role of beliefs on risk perception and the mediation effect of risk perceptions on the link between beliefs and safety behaviour and 3) the role of risk perception on naive causal explanation of accident and the mediating effect of causal explanation on the effect of perceived risk on safety behaviour. Our results are discussed in the following paragraphs.

Fatalistic beliefs predict internal causal explanation of accidents among healthcare workers

Contrary to our hypothesis, the outcome of our analysis with the internality score of naive causal explanation shows that having fatalistic beliefs do not lead healthcare workers to provide external causal factors to explain hospital work accidents. This finding is remarkable as it does not agree with what is available in the scientific literature that fatalistic beliefs will positively predict external causal explanation of accidents (Kouabenan, 2013; Peltzer et al., 2003). Given that fatalism is a form of belief that is associated with the thought that accidents are inevitable, and uncontrollable (Maercker et al., 2019; Nguetsa & Kouabenan, 2017), people with this form of belief tend to justify that accident causes emanates from factors outside the individual which are external and uncontrollable. Citing examples from the literature, Kouabenan (2013) observed that fatalistic individuals downplay the role of the factors that implicates their initiatives in accident situations and tend to favour accident causes to external and uncontrollable factors, such as infrastructure, others, and fate. Equally, Peltzer et al. (2003) show that possessing a strong fatalistic belief leads to explaining accident as bad luck.

Exceptionally, this was not the case with Nigerian healthcare workers as the result of our analysis shows that healthcare workers fatalistic beliefs do not influence them to explain accidents by factors beyond human control. In explaining this, we can believe that other factors could play a role in the explanations of causal factors among healthcare workers. Kouabenan (2007, 2013) noted that the question of whether fatalistic beliefs influence accident explanations, may depend on the level of education, gaps in knowledge about the accident process, but even more on how an individual relates to accidents. One may likely believe that HCWs are well-read individuals because of their intensive

educational process before obtaining a qualification as a healthcare worker. Therefore, their level of education may explain their understanding of work accident and the causes rather than giving causal attributions from the conviction that accidents are pre-determined and uncontrollable. This would be a point for further analysis of comparison on fatalism and causal explanations between highly educated class of workers and other group of workers from a different sector whose work require little or no education. Moreover, the nature of work environment plays a role in causal explanations and may be the case in our findings. According to Gyekye (2010), causal attributions can be determined by organizational framework and the efficiency of work safety policies. The author went further to state that workers in an organization where there is emphasis on safety practices, are likely to have better knowledge about accident causes and applies more complex method in explaining accidents which may involve both internal and external causal attributions. This was observed from HCWs responses in our exploratory study in chapter 6, where greater percentage of the HCWs explained accident causes by both internal and external causes. For instance, a participant in the interview mentioned causes such as “*unavailability of safety materials, improper disposal of sharps and used materials, not using safety wears, violence from patients and patients’ relatives.*” These responses have both internal and external accident causal factors. Besides, causal explanations and fatalism are factors that could explain safety behaviour.

Control beliefs encourages overestimation of risk severity and risk controllability and not risk probability and perceived risk severity mediates the effect of control beliefs on safety behaviour

The belief in one's capacity to manage risk has been associated with underestimation of risk likelihood and its severity (Chaurand & Delhomme, 2013; Puchades et al., 2018). Ordinarily, overconfidence could make an individual to believe that risk situation is under control and the potential outcome can be managed (Puchades et al., 2018). Thus, one may tend to have low perception of the probability and severity of such risky situation. Contrary to this literature, we found from our analysis that HCWs control beliefs is positively and significantly related to high perceived severity of hospital risk. This mean that HCWs perceived control to manage risk does not cause them to underestimate the severity associated with hospital work risks. Indeed, perceiving the severity of hospital risk seems to be particularly important to HCWs. This is a proof that HCWs have a good level of knowledge of the dreadfulness of risks consequences in the hospital irrespective of their perceived behavioural control. Additionally, it was thought that control beliefs will be negatively related with perceived risk probability, but we did not observe a significant result from our analysis. It is possible that despite the scientific and controlled nature of hospital work environment, health workers may not rule out the possibility of accident occurring. Although this was not confirmed, we can conclude that HCWs control beliefs does not predict their perceived risk probability.

Generally, research has shown that perceived control is mostly associated with low-risk perception (Nordgren et al., 2007). Irrespective of the level of studies on the effect of control beliefs on risk perception, it is remarkable to note that nothing has been done specifically on the influence of control beliefs on perceived risk controllability.

Therefore, to bridge this gap in scientific knowledge on the link between control beliefs and perceived risk controllability, we assumed that the relationship between control beliefs and perceived risk controllability will be positive and significant. This was confirmed in the result of our analysis. Hence, when workers have high control beliefs, they tend to perceive risk as controllable.

Additionally, the analysis on the mediation effect of control beliefs on safety behaviour by risk perception, shows that the effect of control beliefs on safety behaviour is through the perceived severity of risk. This shows that for HCWs control beliefs to positively influence their safety behaviour, they will have high perception of the severity of risk in their work. We recorded earlier in chapter 7 that control beliefs do not predict HCWs safety behaviour but when their perceived severity is introduced, their safety behaviour improves. Therefore, risk perception severity is a strong mediator of the effect of control beliefs on safety behaviour. Apart from the effect of control beliefs on risk perceptions, normative beliefs are also a determinant of risk perception among HCWs.

Normative beliefs encourage overestimation of risk probability and risk severity and not risk controllability and perceived risk severity mediates the effect of normative beliefs on safety behaviour

Our results show that perceived risk probability and perceived risk severity are significantly high among healthcare workers that possesses strong normative beliefs. This result is consistent with that of Page et al. (2012) who show that people who abide by the expectations of important people in their lives, tend to overestimate the risk associated with their environment. Indeed, normative pressure on expected behaviour among HCWs, is a strong determinant of their perception of risk likelihood and its severity but not its

controllability. We did not establish any significant effect of normative beliefs on perceived controllability of hospital work risk. We can say that healthcare workers belief in the opinion of referent others does not influence them to perceive that hospital risk is controllable. Therefore, their normative beliefs do not determine their perceived controllability of hospital risk.

Moreover, we recall in chapter 7 that normative beliefs do not predict safety behaviour. On the contrary, when the effect of normative beliefs on safety behaviour is being mediated by perceived risk severity, the effect of normative beliefs on safety behaviour becomes positive. Therefore, the positive influence of normative beliefs on safety behaviour is possible when the workers perceive the severity of hospital risk. Lewis and Thombs (2005) found that high beliefs in the behavioural expectations of important persons and high perceived vulnerability of risk will lead to involvement in safe behaviour. In our study, we recorded similar result with perceived risk severity. Therefore, one can conclude that significant effect of normative beliefs on safety behaviour is stronger when the individual perceives the severity of risk.

Fatalistic beliefs do not significantly predict perceived risk probability, severity and controllability

We did not record any significant effect of fatalistic beliefs on perceived risk likelihood, perceived risk severity and perceived risk controllability. This could be that HCWs fatalistic beliefs cannot manipulate their perception about hospital risk. Notwithstanding, we established some significant relationship between healthcare workers personal characteristics and their perception of risks.

Risk perceptions of health workers are predictors of internal causal explanations of accident

Principally, we recorded a significant relationship between risk perception and causal explanations of accident. We observed that the more healthcare workers perceive the probability and severity of hospital risks, the more they cite accident causes relating to internal factors. These results are in line with the findings of Boua (2021); Kouabenan, 1998; Kouabenan (2002); Mannetti, and Pierro (1991); and Rickard (2014), that elevated risk perception is positively correlated with causal explanations related to dispositional factors. Therefore, the more healthcare workers perceive the likelihood of risk and its severity, the more they provide internal factors in explaining accident at the workplace.

Conclusion

It is interesting, to see that beliefs are determinant factors in causal explanation of accidents and risk perception. This confirms the assertions of Kouabenan (1999) that causal explanations and risk perception can be better understood through individuals' representations and beliefs. Contrary to available literature, the positive internality score of naive causal explanation obtained in the regression analysis between fatalistic beliefs and causal explanations show that fatalistic beliefs among HCWs do not lead them to explain accident by external factors. Rather, their fatalistic beliefs were positively related with their internal causal explanation of accident. We explained that HCWs education can be a strong factor that can bring about this change. We also observed that individuals with high control beliefs and high normative beliefs, tend to perceive risk and adopt safety behaviour. Additionally, we established that the effect of perceived risk on safety behaviour is better understood through internal causal explanation of accidents. We recall

in chapter 9 that perceived risk controllability was not significantly related to HCWs safety behaviour. It is interesting to note that when workers perceive risk controllability and recognizes personal factors in explaining accident, they tend to adopt safety behaviour. Therefore, the effect of perceived risk controllability on safety behaviour is through the internal causal explanation. The results obtained are vital in the study of work safety behaviour and accident prevention through understanding individuals' beliefs, explanation of accident and risk perception. Therefore, the knowledge gathered in this chapter are practical in accident analysis and prevention.

GENERAL DISCUSSION

The study presented in this thesis aimed at investigating the role of beliefs, naive causal explanation of accident and risk perception in understanding hospital accident situations, workers perceived effectiveness of preventive actions and workers safety behaviour at the workplace. The focus is to explore the relationship between beliefs (fatalistic, control, normative), naive explanation of accident, risk perception, perceived effectiveness of preventive measures and safety behaviour. Interestingly, we obtained results that are in line with the findings of previous studies. Moreover, some results were contrary to our proposal and possible causes of the outcome were discussed. We also recorded new and original results that are additions to existing knowledge in the scientific literature. The study was carried out in two phases, by interview (exploratory) and by questionnaire (empirical). The general findings will be discussed respectively in subsequent headings.

Understanding risks and accidents in Nigerian hospitals through the exploratory analysis of naive explanations of hospital accidents by healthcare workers

An overview of the exploratory study reveals that accident situation can be explicitly understood through workers risk perception and their naive causal explanations of accident. As a result, we established that the risks healthcare workers perceive at their workplace (biological risks, physical risks, psychological risks, etc.) corroborates with the categories of hospital risk as outlined in the scientific literature (United States Department of Labor, 2019). Moreover, the analysis of the causal explanations of accident given by healthcare workers supports the model of naive explanation of accident by Kouabenan (1999) which reveals that internal and external factors are given to explain

accident situations at the hospital. Following Weiner's (1979, 1985) categorization of causal attributions, we further distinguished controllable and uncontrollable causal attributions of both the internal and external causes of hospital accident from the responses of HCWs. These findings on the pattern of causal attribution of hospital accident by HCWs indicates that naive explanations of accident can be favorable in accident analysis and prevention.

According to the results of our analysis, we generally recorded that HCWs gave slightly more external factors in explaining accident at their workplace. Although, sufficient attention to avoiding harm (carelessness) and improper safety practice were mostly mentioned causes of accident which are internal causal factors. Additionally, in defining accident, majority of HCWs defined accident as an unplanned event, while few others believed that accidents are preventable negative occurrence. These definitions have elements of controllable and uncontrollable factors in accident situation which strengthens the assertions of the model of causal attribution by Weiner (1979) on the categorization of accident causes. Regarding the perception of hospital work risks, we were able to distinguish three characteristics of risk perception: perceived risk likelihood, perceived risk severity and perceived risk controllability. This outcome of the exploratory analysis to understand how HCWs perceive risks, agrees with the psychometric model (Slovic, 1987) and the model of expected utility (Shanteau & Pingetot, 2009). These models distinguished these risk characteristics in the study of risk perception. Hence, the exploratory study was useful in ensuring that the variables of study were obtainable among the population of HCWs in Nigerian hospitals. An overview of the results of the principal hypothesis from the quantitative analyses, will be discussed in the following paragraphs.

Beliefs as factors in safety behaviour, perceived effectiveness of preventive actions and causal explanations of accident

Our study reveals that healthcare workers that have high fatalistic beliefs, engage in less safe behaviour towards risks at the workplace. This is recorded in several studies on fatalism and safety behaviour (McIlroy et al., 2020; Patwary et al., 2012). Indeed, feeling of lack of control and of helplessness over accident situations weaken individuals' commitment towards taking precaution at work. This makes fatalism a compromising factor to safety behaviour at work. In difficult accident situations devoid of human explanations, fatalism emerges to attenuate cognitive discomfort that can compensate for the lack of control (Kouabenan, 2007).

Additionally, people who are overwhelmed by the thought that accidents are predetermined and unavoidable, believe that measures taken to prevent accident and diseases at work are not effective. This means that fatalistic individuals can have the mindset that safety actions do not keep accident away as accident that are bound to happen will happen irrespective of the actions taken to prevent them. Our finding on the negative influence of fatalism on the perception of preventive actions is interesting and an ingenious addition to scientific literature on the role of fatalistic beliefs on perceived effectiveness of work safety. Basically, this original finding has clearly established that fatalistic beliefs negatively predict the perception of preventive actions among Nigerian HCWs. The negative role of fatalistic beliefs on safety behaviour and the perception of preventive actions is an indication that improving HCWs beliefs should be an uncompromised step towards improving accident situation at work.

Certainly, it is expected that fatalistic individuals will provide external and uncontrollable factors to explain accident (Peltzer & Renner, 2003). In contrast to this

assumption, we observed in the case of Nigerian HCWs, an unusual outcome that HCWs fatalistic beliefs negatively predicted their external causal explanations. HCWs fatalistic beliefs do not lead them to compromise their objective explanation of accident causes by internal factors. We suggested considering confounding personal attributes in the link between fatalistic beliefs and causal explanations of accident. For instance, we found that fatalism is mostly associated with individuals who have no accident experience, people who have a lower study level and younger folks. These variables may indirectly affect the relationship between fatalism and causal explanation. Therefore, there is need to elaborate on these variables and their link with fatalistic beliefs.

Beyond fatalism, perceived behavioural control and normative beliefs are also factors that can explain behaviour and causal explanations of accident. Although we did not record a significant direct effect of control beliefs and normative beliefs, we found that internal causal explanation of accident mediates the effect of control beliefs and normative beliefs on safety behaviour. This show that the positive effect of control beliefs and normative safety behaviour is defined by internal causal explanations.

Causal explanations of accident: predictors of safety behaviour and the perception of preventive actions

Prior research has demonstrated that giving personal factors in explaining accident encourages involvement in safety behaviour (Boua, 2021; Ngueutsa, 2013; Rusch et al., 2003). This result although not confirmed in our study, the direction of our outcome shows that HCWs who recognizes more internal factors in explaining hospital accident tend to observe safety rules. Therefore, accident causal attribution void of bias in attributing errors to situational factors is likely to improve healthcare workers

commitment to safety protocols. Indeed, causal explanation is a useful tool in accident analysis and evaluation of individual behaviour towards risks.

In addition, when health workers explain accident by external factors, they tend to perceive less the effectiveness of preventive actions. This is contrary to the study by Mbaye and Kouabenan (2013) that perceiving experienced-based analysis as effective can influence people to explain accident by internal factors. Therefore, when accidents causes are attributed to uncontrollable external factors, preventive actions will likely be seen as not to effective. Moreover, perceived effectiveness of preventive actions tends to inspire individuals to apply safety precautions. Indeed, our results show that positive evaluation of preventive actions can encourage healthcare workers to take safety measures towards risk and accident prevention. A positive relationship between perceived effectiveness and safety behaviour was established in the study by Bechard et al. (2021). They established that people who perceive the effectiveness of the preventive measures against COVID 19, are more likely to adopt safety behaviour than those who have low perceived effectiveness of the preventive actions.

Perceiving risks at work strengthens involvement in safety precautions and internal causal explanations of accident

Studies have established that risk perception is an influential determinant of safety behaviour (Boua, 2021; Neuburger & Egger, 2021; Simsekoglu et al., 2013). Specifically, we found that perceiving the severity of hospital risk had a strong positive effect on the behaviour of healthcare workers. This finding is in line with Carico et al. (2020) and Kayani et al. (2021) who found that perceived severity of risk positively influences safety behaviour. Among the three characteristics of risk studied (probability, severity, and

controllability), HCWs behaviour was positively influenced only by their perception of the severity of hospital risks. This finding is useful for insight into the aspect of risk perception that mostly affects behaviour of HCWs. Therefore, focus on the characteristic of risk can help to clearly define the aspect of risk perception that can improve safe behaviour.

Further analysis reveals that perceiving risk influences causal explanations of accident (Palat & Delhomme, 2018; Rickard, 2014). We recall that risk perception and the naive explanation of accident are two complementary psychological constructs (Kouabenan, 2009) that helps in understanding behaviour of risk. We learn from our study that perceiving the likelihood of risk, its severity of risk and its controllability leads HCWs to explain accident by personal factors. A combined effect of perceived probability and internal causal explanation leads to safer behaviour while perceiving risk controllability and explaining accident by internal factors leads to insecure behaviour.

GENERAL CONCLUSION

This thesis systematically investigated the subjective determinants of behaviour of Nigerian healthcare workers towards hospital work risks and accidents. The findings reveal that healthcare workers behaviour can be explained by taking into consideration their beliefs (fatalism, control and normative), naive explanation of accident, risk perception, and the perception of preventive actions. Therefore, the impressive outcome of this thesis highlights crucial factors that can be recognized in accident analysis and management for improved workers safety. Practically, the dissonance between objective and subjective assessment and management of work risks and accidents, which compromises the effectiveness of preventive actions can be improved up on through the outcome of this thesis. Theoretically, most findings of this thesis support earlier research on this subject matter. As well, innovative findings were recorded which contributes to the theoretical knowledge in this area of research. These results satisfied the objective of this study with feasible practical implications that can be advantageous in accident prevention and management.

We distinctively observed that fatalism is a potent factor that leads to compromising safety practices and to perceive less the effectiveness of preventive actions. Nevertheless, objective interpretation of accident and safety discourse in modern accident analysis and prevention, fails to recognize fatalism as an indispensable and consequential factor in accident situations. Instead, contemporary ideology in safety management, views fatalism as medieval and a retrogradation to primitive times (Kouabenan, 2009). On this note, the result of this thesis suggests the need to recognize individuals' beliefs (fatalism, control and normative) in risk assessment and safety communications. This indicates that building a stronger positive mindset of Nigerian

HCWs on the controllability of work risk targeted towards curtailing their fatalistic beliefs, cannot be compromised, or overemphasized. For the hospital management to successfully integrate the process of abating fatalism among HCWs, there is a need to update safety curriculum delivered in workers trainings and workshops with facts and messages that will provoke the cognition that accidents can be controlled. In addition, organizing periodical health communication programs is imperative to bring to consciousness, this form of belief that can jeopardize safety behaviour. This will be effective in improving workers knowledge on the fact that personal factors can contribute to accidents, while safety consciousness, can lessen accident occurrences and increasing work safety. This can be supported by the fact that explaining accident by internal factors, improves involvement in safety protocols. This suggests the importance of workers to recognize internal factors in explaining work accident.

Furthermore, our results reveal that improving workers perceived seriousness of the risk associated with hospital work is useful in enhancing safety practices among HCWs. When compared with other characteristics of risk, perceived risk severity is very distinct in its positive effect on safety behaviour. Accordingly, we would suggest the use of technology and media for easy dissemination of information across to HCWs on the gravity of the risks associated with their work, which can improve their long-term safety commitment. Example, hospital management can make use of social media channels like emails, WhatsApp, etc., to pass messages across to all HCWs. This can be avenues for sending seasonal reminders on the adverse effects of hospital work risks and the importance of abiding by safety policies. As an example, health posters that contains messages in form of texts or graphics on the seriousness of hospital risk can be placed in strategic positions in hospitals as safety reminders. Moreover, considering the link

between beliefs and risk perception, activities meant to boost perceived seriousness of risk among HCWs can inversely lower their fatalistic judgement of work risk and accident. Since fatalism is higher among younger HCWs, and those who have not advanced in their study, it is vital to prioritize these group of people and ensure they are well represented in health communication programs that are designed to discourage fatalistic beliefs among healthcare workers.

Additionally, we observed that when health workers perceive the effectiveness of preventive measures, they are likely to engage in safety behaviour. This means that having rules is not enough. It is necessary to check that they are understandable, that their application is possible and does not require too much effort on the part of workers who might be tempted to circumvent them. Furthermore, the acceptance of the rules by HCWs is fundamental because their adherence depends on their perception of the effectiveness of these rules in preventing the risks they perceive and their explanations of accidents in their working environment. We can infer on the contrary that when healthcare workers perceive preventive actions as ineffective, it can lead them to find alternative based on their personal initiatives which may be against proper medical practice. Hence, exposing them to insecure behaviour that can jeopardize their safety. We recall a statement from a female participant during the interview phase who mentioned improvising when there is lack of personal protective equipment. She gave example of using ordinary nylon in the absence of hand gloves. This behaviour can expose a HCW to infections and diseases because nylon is not adapted to fit the fingers and protect fluid from penetrating into the skin. Therefore, considering workers perception about the effectiveness of preventive measures put in place or the ones that are lacking can serve as feedback on what hospital management need to improve on or maintain. Therefore, provision of infrastructures and

safety equipment can complement workers perceived effectiveness which can boost their involvement in preventive actions.

Moreover, we found that risk perception is positively linked with the perception of preventive measures. Indeed, when HCWs perceived that hospital risk is controllable, they are convinced that the preventive actions are effective for accident prevention. As an addition to existing findings on risk perception, perceiving the likelihood and seriousness of risk do not lead HCWs to believe that preventive actions are not working. Rather, they understand the seriousness of the effect of risk on the health worker if encountered. This factor can be explained by the level of HCWs education. We found that the higher they acquire education, the more they perceive the seriousness and likelihood of risk. This indicates the importance of studying risk perception based on its different characteristics than as a wholistic concept. It makes it clearer to understand how the different attributes of risk interacts with other concepts to influence behaviour. These findings are useful in understanding the mechanism of how HCWs respond to risks at the workplace.

Generally, hospital management should take into consideration both the HCWs beliefs, their causal explanations of accident and their risk perception in understanding their work behaviour for better preventive strategies. Hence, in designing preventive programs, cognizance should be taken across measures to salvage both internal and external causes of hospital work accidents. The responsibility rests on the management to see alongside with the health workers, their risk perceptions and their causal explanations of accident for an effective and workable preventive policy. The work of Kouabenan et al. (2015) established that first line managers' who perceives the risks their employees are facing are the ones that engaged more in safety management. This is a vital point to

be considered by hospital management in improving involvement of health personnel in safety management.

Hence, risk communication is highly recommended because it plays a significant role in safety decision and policy making. According to Kouabenan (2014), poor risk communication can give rise to poor safety management and non-compliance to safety rules. Hospital management should develop a good risk communication channel with health personnel to better understand their perception of risk and accident causal attributions. This will help to structure risk communication campaigns that will positively impact on the behaviour of HCWs at work. Additionally, risk communication campaigns can be achieved through workshops and trainings of workers to improve their understanding of safety protocols that can help in risk management and accident prevention.

Thus, in working towards a safer work environment for Nigerian HCWs, a joint action should be taken by hospital managements and the Nigerian health authorities for a better and enduring positive result. Government can participate by passing and reviewing bills that supports the safety of Nigerian healthcare workers taking into consideration their beliefs and personal representatives. They can generate more funds to sponsor workers training and retraining programs, health campaigns and improved disease and accident surveillance system. Indeed, hospital management and the Nigerian health authorities can adopt the findings of this thesis to improve health work policies. These policies will recognize HCWs beliefs and personal representations than solely on technical issues. Also, it can be more productive to engage the services of work Psychologists who can work closely with health experts in accident analysis and management. This will facilitate accident investigations, understanding how HCWs are motivated to comply to safety

protocols and producing factors that can contribute to policy formulations and reformulations.

Most importantly, for every effective preventive action, there is need for feedback. There is need to draw strategies for follow up on workers after trainings and campaigns to get feedback on their experiences and how they understand the actual causes of their accident. This will be useful in designing an enduring and reliable preventive measure that cannot be compromised by such beliefs. This approach can be archived through a longitudinal study. This will establish the long-term effect of the continuous trainings and campaigns that aim at reducing fatalism among health workers. If on a longer period, the negative effect of fatalistic beliefs on safety behaviour and perceived effectiveness of preventive actions drops drastically, there will be need to permanently add the training content in HCWs curriculum to keep on passing the knowledge and to prevent reoccurrence of accidents that can occur as a result of unsafe behaviour that are influenced by beliefs.

Regardless of the contributions of this thesis, there are a few limitations to note, that creates gap for further research. Firstly, the scale for measuring safety behaviour had a limit reliability index. Some of the questions in the scale needs to be rephrased with better medical scientific terms to improve understanding. Therefore, there will be need to revise and revalidate the safety behaviour scale for future research. Likewise, it will be useful to revise the scale measuring naïve explanation of accident. The scale reduction of the two factors of the naive causal explanation scale according to the theory of causal explanation by Kouabenan (1999) were difficult to distinguish through exploratory factor analysis. In the CFA, although the internal consistency of the scale is high, the value of intercorrelation between the internal and external explanations is high. Although the value

for an intercorrelation between the factors is less than one (Lyons-Thomas, 2014), there is need to work more on this scale and revalidate it for future studies.

Secondly, data collection for this thesis encountered a serious challenge that emerged from the outbreak of Corona virus in March 2020. The data collection which was meant to end by May 2020 was cut short in the first half of March 2020 as it became more difficult to assess HCWs. Worker's perception of the risk of COVID-19 was high that they drastically cut any form of unnecessary close interaction with people. This situation affected our EFA from meeting the criteria of 10:1 participants-item ratio (Nunnally, 1978; Thompson, 2004). In our own case, we had 7.3:1 ratio for the EFA. Although some authors argued using 500 participants for EFA is very good (Comfrey & Lee, 1992) which is the case for our study EFA. Nevertheless, it will be interesting to carry out these two methods with a data set that meets the two conditions to establish if they can produce similar results or which among the 2 criteria can give a better result.

The third limitation of the study is on the methodology. The study applied cross-sectional design with the use of self-report questionnaires for data collection. Consequently, the data is likely to be influenced by report bias which can affect the true relationship between the measured constructs. Unfortunately, there is no means of verifying the correctness of these information. Again, although cross-sectional method used in this research can be useful in making inferences and describing characteristics of the population of interest, it would not allow to determine cause-and-effect relationship between variables. Also, cross-sectional study can be influenced by cohort differences. Therefore, longitudinal design can be an option to boycott these limitations and to compare the study measures over a long period. Longitudinal studies can be analyzed

with linear mixed model which is currently an interesting method of analyzing multiple data.

Furthermore, this research covered only 5 categories of HCWs out of the over 38 other categories of HCWs as stated in the classification of health workforce statistics (WHO, 2010). Therefore, to expand the generalizability and replicability of the results, more studies on this subject matter should be carried out among other categories of HCWs that mostly have similar risk and accident experiences with the participants of this study. Hence, we would suggest adding other categories like dentists, nursing associate professionals, midwifery associate professionals, medical assistants, ambulance care workers and hospital waste management workers. This study can also be extended to categories of healthcare workers that share peculiar risks following the models applied in this study.

Although the result of this thesis improves our knowledge on the role of beliefs, naive causal explanations and risk perception on the behaviour of healthcare workers, there is need to go beyond reported behaviours of HCWs to observed behaviour. This could be a limitation in establishing the true behaviour of healthcare workers and the level of the existence of the beliefs they possess. Additionally, the number of healthcare workers that represented the three Nigerian Eastern states in this study may not be sufficient to generalize the result. In this regard, it will be imperative to increase the number of participants in future studies. Finally, the global analyses of study variables were not subjected to structural equation model. According to Beran and Violato (2010), structural equation is more influential than regression analysis because it assesses linear causal relationships between variables and at the same time, account for measurement error.

Notwithstanding, it is indeed imperative to study the influence of beliefs, causal explanations of accident and risk perception on behaviours of healthcare workers and on their perceived effectiveness of preventive actions. Interestingly, we can say that this thesis is the first to consider multiple subjective determinants in understanding HCWs behaviour in Nigerian hospitals. Following the findings as discussed in the discussion and conclusion sections, various practical recommendations were given which can be influential to salvage accident occurrences among HCWs. These preventive recommendations targets improved work safety and health of Nigerian HCWs. Lastly, this study unveils a new area of research to improve our understanding and knowledge on work risk and accident and the practical activities to put their consequences in check.

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ANNEXES

Annex 1

Flow chart of the thesis process

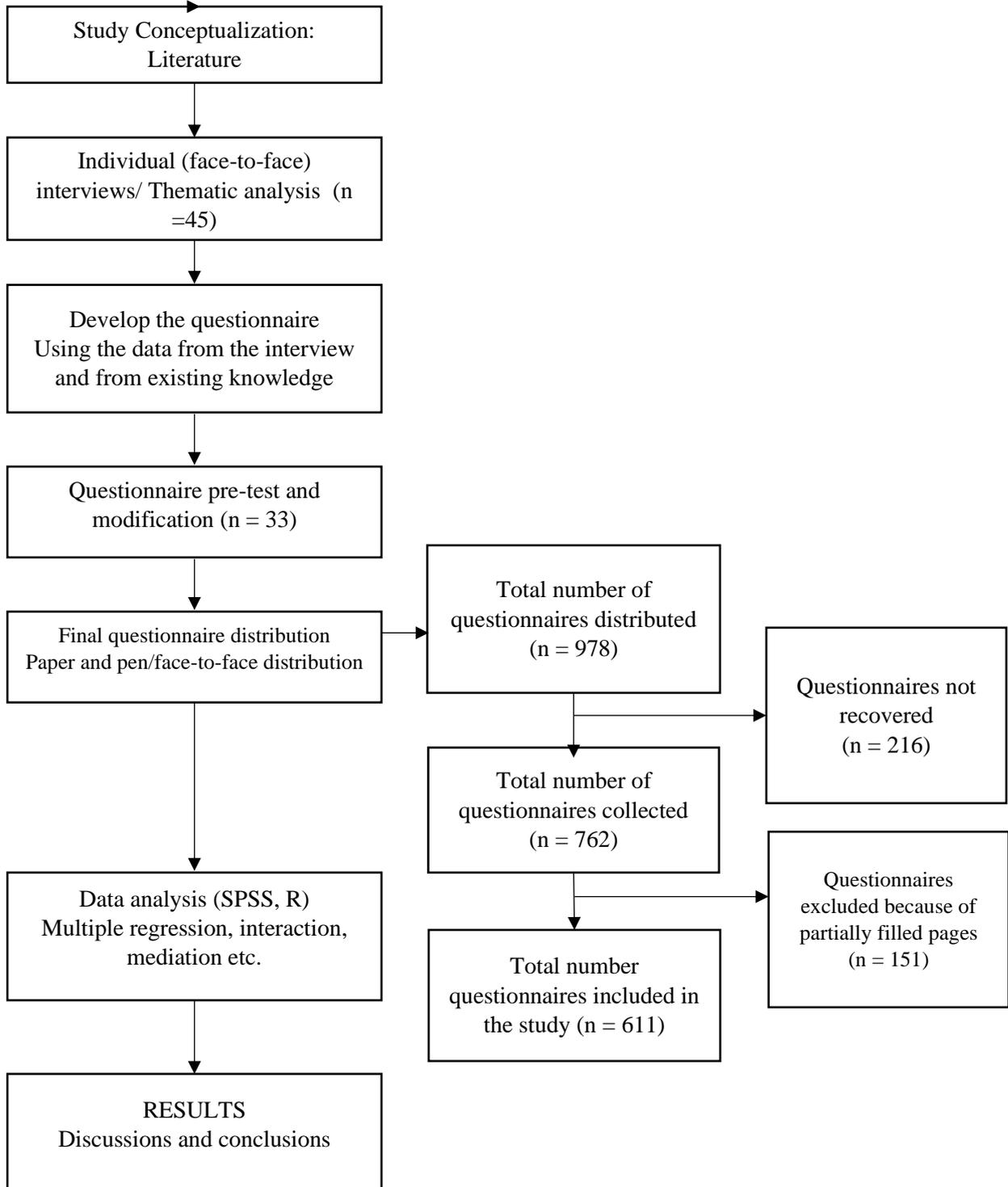


Figure 52: Flow chart of the thesis process

Annex 2

Interview guide

PRESENTATION

Good day, my name is Arinze Nwadiogo, I am a PhD student at Université Grenoble Alpes, France and I am working on beliefs, explanation of accident, risk perception and safety among Nigerian health care workers. To collect the data for my research work, I need to have interview with people like you. It's my pleasure meeting you.

This interview is aimed at understanding the position or viewpoint of Nigerian health workers on risks and accidents that happen around them at work. It is anonymous and I would like you to participate in my research, do you agree?

In order to easily recall your answers and to translate them correctly, I would like to record this interview. Do you agree?

Your answers will be kept confidential. Your responses will be processed and used strictly for scientific purpose.

This is a standardized, open-ended interview. There are no wrong or right answers for each question. It is your opinion that is important to me. The interview will take approximately 20-30 minutes.

Thank you for accepting to answer my questions.

I. Perceptions of hospital risks

1. In your own opinion, what is risk?
2. Can you tell me the various risks that you face in your profession?
3. What could be the consequences of these risks on workers like you?

II. Explanation of hospital work accident causes

4. In your own opinion, what is an accident?
5. What do you think is the reason why accidents happen in your workplace?

III. Beliefs

6. What are your beliefs about accidents that happen in your workplace in particular?

IV. Behaviour of healthcare workers

7. What do you do when you are faced with risk in your work?
8. What are you doing to manage risk in your workplace?
9. What do you do to avoid accidents in your workplace?

V. Perception of preventive actions

10. Are you aware of the different actions undertaken in your health sector to prevent diseases or accidents in your health sector?
11. Can you give me the list of these actions?
12. Have you taken part in these actions?
13. What is the efficiency of the actions that are undertaken by the management?
If no, could you explain why you think they failed? If yes, why?
14. As a health worker what do you think should be considered as a priority in curbing accidents in the hospital?

VI. General information

15. Gender.....
16. Age.....
17. Length of service year.....
18. Job category.....
19. Department.....
20. Level of education.....
21. Ethnic background.....
22. Do you have any question or comment concerning this interview?

Conclusion

This is the end of the interview. I thank you for your answers and for sacrificing your time to be here with me today.

Annex 3

Table 27

Summary of the descriptive statistics of the study participants

Characteristics	Categories	N	%
Health workers	General medical practitioners	140	23
	Specialist medical practitioners	119	19.5
	Professional nurses	143	23.4
	Professional mid-wives	34	5.6
	Lab. Scientists/Technologists	165	27
	Missing data	10	1.6
Gender	Male	292	48.1
	Female	314	51.8
	Missing data	5	0.82
Level of study	Secondary school graduates	43	7.04
	University graduates	404	66.12
	Postgraduate	151	24.71
	Missing data	13	2.13
Accident experience	Accident victims	293	48
	No accident	314	51.3
	Missing data	4	0.7
Accident experience by gender	Male	151	51
	Female	143	49
Hospital type	Public	432	70.7
	Private	158	25.9
	Missing data	21	3.4
Accident severity	No injury	57	19.5
	Light injury	203	69.3
	Serious injury	32	10.9
	Missing data	1	0.3
Average age		32.8	
Average years of work		7.43	
TOTAL		611	100

Note: N = number of respondents

Annex 4

Table 28

Summary of the reliability test

Scales		Number of items	Cronbach's Alpha
Fatalistic beliefs		6	.77
Control beliefs		6	.74
Normative beliefs		6	.94
Perceived risk probability		10	.91
Perceived risk severity		10	.94
Perceived risk controllability		10	.92
Naive explanation of accident		8	.90
Perceived effectiveness of preventive actions		12	.92
Safety behaviour	Factor 1	5	.65
	Factor 2	4	.61

Annex 5



Questionnaire on risks and accident in the Nigerian health sector

As a part of research on healthcare workers safety, we carry out a study on the risks and causes of accident in the Nigerian healthcare sector.

The objective of this study is to understand your viewpoint on health hazards and accidents that happen around you in the healthcare sector. Your responses will be important in designing strategy for reducing risks and accidents in the healthcare sector.

Answering this questionnaire will take you approximately 25 minutes and there are no wrong or right answers; it is your opinion that is important.

The questionnaire is anonymous. Your responses will be kept confidential and will be processed and used strictly for scientific purpose.

Please carefully read the instructions and answer sincerely.

Thank you for your participation!

1. Here are series of situation which a health worker may encounter at work. What is the **probability** at which you can find yourself in each of these situations? Circle the number that best corresponds to your response.

1 = Very low probability

2 = Low probability

3 = Moderately probable

4 = High Probability

5 = Very high probability

		1= Very low probability	2= Low probability	3= Moderately probable	4= high probability	5= Very high probability
1	Having splash of biological fluid (blood and bodily fluids)	1	2	3	4	5
2	Contracting HIV	1	2	3	4	5
3	Injuries from falls that may lead to fracture or bruises	1	2	3	4	5
4	Contracting Tuberculosis	1	2	3	4	5
5	Getting needle stick injury	1	2	3	4	5
6	Contracting viral Lassa fever	1	2	3	4	5
7	Getting injury from sharps (blades etc.)	1	2	3	4	5
8	Getting infected with Hepatitis infection (B or C)	1	2	3	4	5
9	Physical attack from patients and relatives	1	2	3	4	5
10	Psychological distress	1	2	3	4	5

2. Here is the same list of events. Now we ask you to estimate the **seriousness** of the effect of these risks if you face any of these situations. Circle the number that best corresponds to your response.

- 1 = Not serious at all
- 2 = Slightly serious
- 3 = Somewhat serious
- 4 = Much serious
- 5 = Very much serious

		1= Not serious at all	2= Slightly serious	3= Somewhat serious	4= Much serious	5= Very much serious
1	Having splash of biological fluid (blood and bodily fluids)	1	2	3	4	5
2	Contracting HIV	1	2	3	4	5
3	Injuries from falls that may lead to fracture or bruises	1	2	3	4	5
4	Contracting Tuberculosis	1	2	3	4	5
5	Getting needle stick injury	1	2	3	4	5
6	Contracting Lassa fever	1	2	3	4	5
7	Getting injury from sharps (blades etc.)	1	2	3	4	5
8	Getting infected with Hepatitis infection (B or C)	1	2	3	4	5
9	Physical attack from patients and relatives	1	2	3	4	5
10	Psychological distress	1	2	3	4	5

3. Here again is the same list of situations again. We now ask you to evaluate how much **control** you can exert on these events to reduce their probability of occurrence. By "control" we mean the possibility for you to take precautions that significantly reduce the risk.

Attention: for the moment we do not ask you if you actually take these precautions, but the amount of control you think to have on each of these situations.

- 1 = Not much control
- 2 = Little control
- 3 = Somewhat control
- 4 = Much control
- 5 = Very much control

		1= Not much control	2= Little control	3= Somewhat control	4= Much control	5= Very much control
1	Having splash of biological fluid (blood and bodily fluids)	1	2	3	4	5
2	Contracting HIV	1	2	3	4	5
3	Injuries from falls that may lead to fracture or bruises	1	2	3	4	5
4	Contracting Tuberculosis	1	2	3	4	5
5	Getting needle stick injury	1	2	3	4	5
6	Contracting Lassa fever	1	2	3	4	5
7	Getting injury from sharps (blades etc.)	1	2	3	4	5
8	Getting infected with Hepatitis infection (B or C)	1	2	3	4	5
9	Physical attack from patients and relatives	1	2	3	4	5
10	Psychological distress	1	2	3	4	5

4. Here are different possible factors that can **explain accident** of healthcare workers in the health sector. In your own opinion what is the importance of each of these causes in the occurrence of an accident and diseases in Nigerian health sector? Circle the number that indicates your best response.

- 1 = Not at all important
- 2 = Less important
- 3 = Moderately important
- 4 = Much important
- 5 = Very much important

		1 = Not at all important	2 = Less important	3 = Moderately important	4 = Much important	5 = Very much important
1	Failure to give enough attention to avoiding harm (carelessness)	1	2	3	4	5
2	Lack of training	1	2	3	4	5
3	Improper safety practice	1	2	3	4	5
4	Tiredness of the worker	1	2	3	4	5
5	Conflict among health workers	1	2	3	4	5
6	Lack of organisation	1	2	3	4	5
7	Emergency situations	1	2	3	4	5
8	Lack of safety equipment	1	2	3	4	5
9	Attack from patients and relative	1	2	3	4	5

5. Here is a list of actions that can be taken to prevent accident and diseases. According to you, what is the **effectiveness** of each action in the prevention of accident and diseases in Nigerian health sector? Circle the number that best corresponds to your answer.

- 1 = Not at all effective
- 2 = Slightly effective
- 3 = Somewhat effective
- 4 = Much effective
- 5= Very much effective

		1 = Not at all effective	2 = Slightly effective	3 = Somewhat effective	4 = Much effective	5 = Very much effective
1	Providing personal safety equipment	1	2	3	4	5
2	Using personal protective equipment	1	2	3	4	5
3	Training and sensitizing health workers	1	2	3	4	5
4	Establishing good relationship with patients	1	2	3	4	5
5	Providing equipment for disposing sharps and other wastes	1	2	3	4	5
6	Arranging the hospital environment	1	2	3	4	5
7	Providing water facilities for hand washing	1	2	3	4	5
8	Participating in training	1	2	3	4	5

6. Here is a series of **claims** that people usually make about risks and accidents at work. What do you think about the following statement when thinking about your work in the health care sector? Circle the number that best correspond to your response.

- 1 = Strongly disagree
- 2 = Disagree
- 3 = Somewhat agree
- 4 = Agree
- 5 = Strongly agree

		1 = Strongly disagree	2 = Disagree	3 = Somewhat agree	4 = Agree	5 = Strongly agree
1	Encountering accident in the hospital is bad luck, there is nothing one can do about it	1	2	3	4	5
2	Very often, the accidents that happen in the hospital are inexplicable phenomenon	1	2	3	4	5
3	When accidents happen, it is because someone somewhere wanted to harm you	1	2	3	4	5
4	Accidents that happen are not predicted so there is nothing one can do	1	2	3	4	5
5	Some sections of the hospitals in Nigeria are haunted by bad spirits that can cause accidents for workers	1	2	3	4	5
6	When an accident happens, it is the person's fate	1	2	3	4	5
7	Most risks health workers come across in the hospital are caused by other people	1	2	3	4	5
8	Before handling a difficult procedure, it is better to consult a seer, you never know	1	2	3	4	5

7. Here is a series of statements related to critical situations of health care in hospitals in Nigeria. Please surround the figure that reflects the mastery you think you have in these situations.

- 1 = Strongly disagree
- 2 = Disagree
- 3 = Somewhat agree
- 4 = Agree
- 5 = Strongly agree

		1 = Strongly disagree	2 = Disagree	3 = Somewhat agree	4 = Agree	5 = Strongly agree
1	I can manage patients with retroviral infections (e.g., HIV)	1	2	3	4	5
2	I have a great ability to predict violence of a patient or patient relative	1	2	3	4	5
3	I can handle needles when giving injections	1	2	3	4	5
4	I have the expertise to handle sharps when carrying out procedure	1	2	3	4	5
5	My experience enables me to thwart risks in the hospital	1	2	3	4	5
6	I can manage an emergency	1	2	3	4	5

8. Here is a series of assertions a health care worker can make. Read carefully and circle the value that best describe your opinion. Note that the closer you are to 7, the **more** you recognize that you should do what is recommended and the closer you get to 1, the **less** you think you should do what is recommended.

1= I should not 7= I Should

1) My Chief medical director thinks that I should use personal protective equipment always when examining a patient

I should not	I Should					
□.....□.....□.....□.....□.....□.....□.....□						
1	2	3	4	5	6	7

2) Most of my friends who have had accident at work think that I should use personal protective equipment always when examining a patient

I should not	I Should					
□.....□.....□.....□.....□.....□.....□						
1	2	3	4	5	6	7

3) My parents think that I should use personal protective equipment always when examining a patient

I should not	I should					
□.....□.....□.....□.....□.....□.....□						
1	2	3	4	5	6	7

4) Most of my colleagues who have had accident at work think that I should use personal protective equipment always when examining a patient

I should not	I should					
□.....□.....□.....□.....□.....□.....□						
1	2	3	4	5	6	7

5) My spouse thinks that I should use personal protective equipment always when examining a patient

I should not	I should					
□.....□.....□.....□.....□.....□.....□						
1	2	3	4	5	6	7

6) Most of my relations who have had accident at work think that I should use personal protective equipment always when examining a patient

I should not	I should					
□.....□.....□.....□.....□.....□.....□						
1	2	3	4	5	6	7

9. Here is a series of situations reflecting the likely behaviours to be undertaken by a health worker. By placing yourself personally in each situation and referring to your usual behaviour, what is your level of agreement or disagreement with these assertions. Circle the number corresponding to your answer

1 = Strongly disagree

2 = Disagree

3 = Somewhat agree

4 = Agree

5 = Strongly agree

		1= Strongly disagree	2= Disagree	3=Somewhat agree	4= Agree	5= Strongly agree
1	When examining patients, I wash my hands only after examination	1	2	3	4	5
2	I avoid handling cases in a rush no matter the situation	1	2	3	4	5
3	When I am tired, I take an exciting to stay awake until I finish my work for the day	1	2	3	4	5
4	When there are many patients to examine, I use a pair of hand gloves for each patient	1	2	3	4	5
5	When there are emergency situations, I get my job done not minding the standard operation procedure	1	2	3	4	5
6	When I predict violence situation, I ensure the presence of a security officer	1	2	3	4	5
7	When personal protective equipment is not available, I go on to handle cases	1	2	3	4	5
8	Each time I resume duty, I look out for risk factors at work	1	2	3	4	5
9	I don't mind my rapport with patients, I care more about getting the job done	1	2	3	4	5
10	When I feel very tired, I try to get some rest before continuing with my work	1	2	3	4	5
11	When trainings are organized, I only attend when it is convenient	1	2	3	4	5
12	When I predict violence situation, I ensure the presence of a security officer	1	2	3	4	5
13	When there is no safety box close to me, I use any dustbin around me to dispose needle or sharps	1	2	3	4	5
14	When examining a patient, I avoid close contact with the patient	1	2	3	4	5

Socio-demographic questions (Circle the alphabet that suits your response)

1. How old are you? years
2. Gender: A. Female B. Male
3. What is your family situation?
 A. Married B. Single C. Divorced D. Widowed E. Separated
4. What is your highest level of education?
 A. Primary B. Secondary C. Graduate D. Post-Graduate
5. What type of hospital are you working in?
 A. Public B. Private
6. What is your job category?
 A. General medical practitioner
 B. Specialist medical practitioner (e.g., Pediatrician, gynecologist etc.)
 C. Professional Nurse
 D. Professional Midwifery
 E. Medical and pathology laboratory technician/Scientist
7. What is the number of your years of experience?
8. Have you ever had an accident at work?
 Yes No
9. If yes how many times
 A. 1 B. 2 C. 3 D. More
 If yes to question 8, what type of accident was that?
10. If yes to question 8, what is the seriousness of the injury?
 A. No injury B. Light injury C. Serious injury
11. If yes to question 8, did you report to the authority
 A. Yes B. No

Annex 6

Results of exploratory factor analysis of the scale measuring fatalistic beliefs

Table 29

Fatalistic beliefs scale saturation indices

Items	Saturation indices	Number of items	Nomination of factors	Cronbach's Alpha
Encountering accident in the hospital is bad luck, there is nothing one can do about it	.620	6	Fatalistic beliefs	.77
When accidents happen, it is because someone somewhere wanted to harm you	.685			
Some sections of the hospitals in Nigeria are haunted by bad spirits that can cause accidents for workers	.737			
When an accident happens, it is the person's fate	.631			
Most risks health workers come across in the hospital are caused by other people	.394			
Before handling a difficult procedure, it is better to consult a seer, you never know	.644			

Table 30

KMO index and Bartlett's test of the scale of fatalistic beliefs

Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO)	.849	
Bartlett's Test of Sphericity	Approx. Chi Square	902.623
	df.	15
	Sig.	.000

KMO index remains satisfactory .85 and Bartlett's test remains significant $p < .001$.

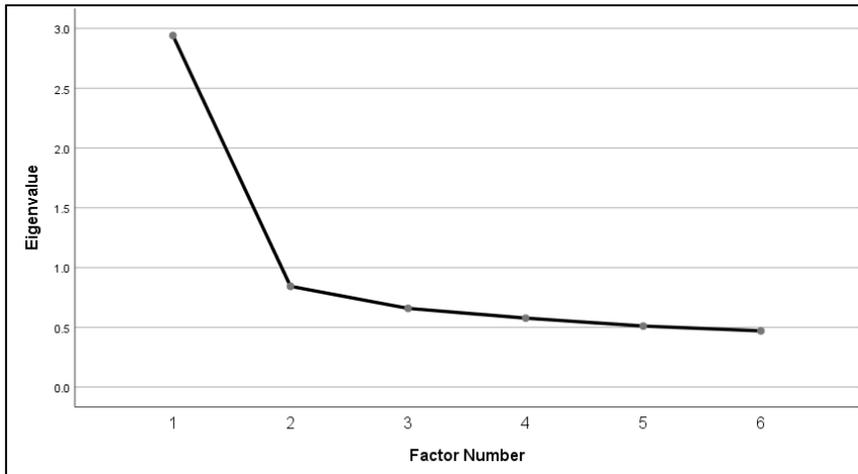


Figure 52: Eigenvalue diagram

Table 31

Reliability fatalistic beliefs (FB) if an item is deleted

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
FB1	8.30	10.186	.528	.309	.738
FB3	8.47	10.617	.580	.365	.731
FB4	8.46	9.901	.618	.413	.717
FB5	8.19	9.929	.554	.326	.731
FB6	7.68	10.184	.358	.136	.793
FB7	8.50	9.962	.553	.331	.732

Annex 7

Results of exploratory factor analysis of the scale measuring control beliefs

Table 32

Control beliefs scale saturation indices

Items	Saturation indices	Number of items	Nomination of factors	Cronbach's Alpha
I can handle patients with retroviral infections (e.g., HIV)	.549	6	Control beliefs	.74
I have a great ability to predict violence of a patient or patient relative	.389			
I have the expertise to handle sharps when carrying out procedure	.709			
My experience enables me to thwart risks in the hospital	.778			
I can manage an emergency	.379			
I can handle needles when giving injections	.613			

Table 33

KMO index and Bartlett's test of the scale of control beliefs

Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO)	.753	
Bartlett's Test of Sphericity	Approx. Chi Square	830.021
	df.	15
	Sig.	.000

KMO index shows satisfactory value .753 and the Bartlett test is significant $P < .001$

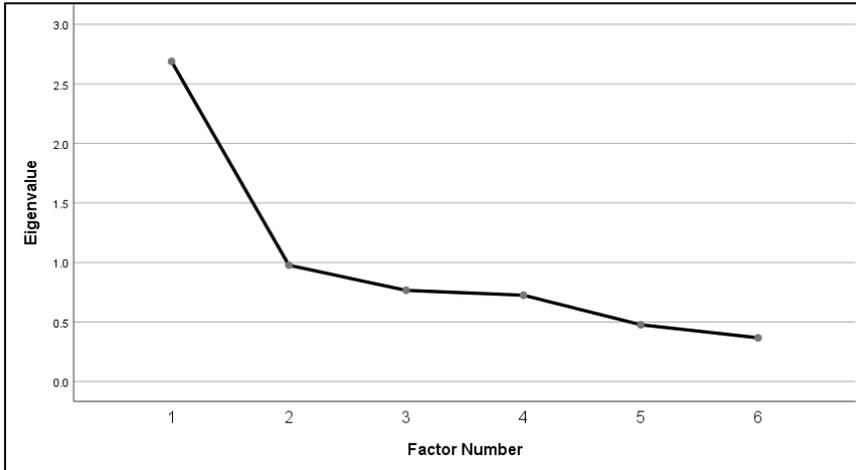


Figure 53: Eigenvalue diagram

Table 34

Reliability of control beliefs (CB) scale if an item is deleted

	Scale means if item deleted	Scale variance if item deleted	Corrected item-Total Correlation	Squared Multiple Correlation	Cronbach's if item deleted
CB1	17.47	11.210	.475	.277	.708
CB2	18.48	11.401	.384	.168	.735
CB3	17.30	11.040	.525	.411	.694
CB4	17.49	10.503	.597	.451	.673
CB5	18.21	11.497	.368	.198	.740
CB6	17.68	11.039	.560	.349	.686

Annex 8

Results of exploratory factor analysis of the scale measuring normative beliefs

Table 35

Normative beliefs scale saturation indices

Items	Saturation indices	Number of items	Nomination of factors	Cronbach's Alpha
My Chief medical director thinks that I should use personal protective equipment always when examining a patient	.817	6	Normative beliefs	.94
Most of my friends who have had accident at work think that I should use personal protective equipment always when examining a patient	.891			
My parents think that I should use personal protective equipment always when examining a patient	.830			
Most of my colleagues who have had accident at work think that I should use personal protective equipment always when examining a patient	.886			
My spouse thinks that I should use personal protective equipment always when examining a patient	.808			
Most of my relations who have had accident at work think that I should use personal protective equipment always when examining a patient	.832			

Table 36

KMO index and Bartlett's test of the scale of normative beliefs

Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO)		.898
Bartlett's Test of Sphericity	Approx. Chi Square	3055.005
	df.	15
	Sig.	.000

KMO index satisfactory value of .898 and the Bartlett test is significant $P < .001$

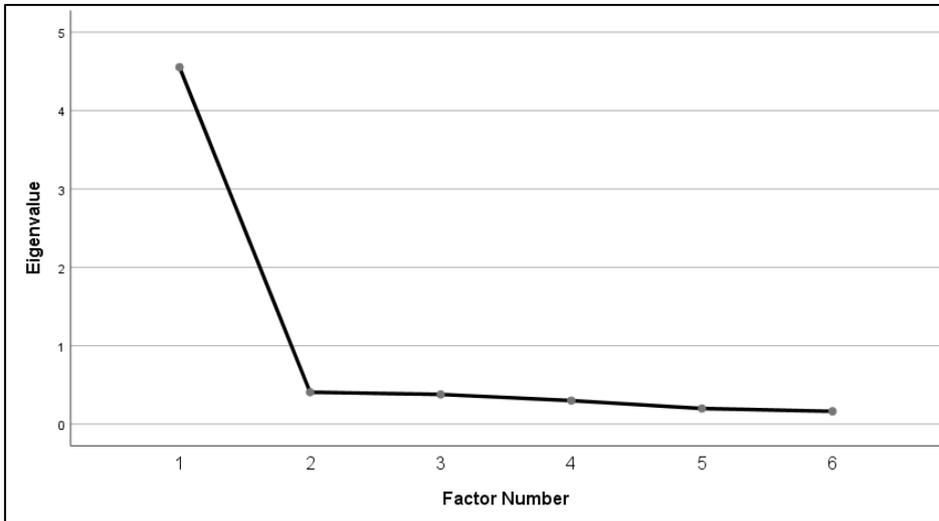


Figure 54: Eigenvalue diagram

Table 37

Reliability of normative beliefs (NB) scale if an item is deleted

	Scale mean if item deleted	Scale variance if item deleted	Corrected item-Total Correlation	Squared Multiple Correlation	Cronbach's if item deleted
NB1	30.41	37.648	.776	.633	.928
NB2	30.49	36.225	.850	.750	.919
NB3	30.54	35.635	.812	.682	.924
NB4	30.36	37.135	.847	.754	.920
NB5	30.28	38.237	.773	.639	.928
NB6	30.45	37.257	.806	.680	.924

Annex 9

Results of exploratory factor analysis of the scale measuring perceived risk probability of risks

Table 38

Perceived risk probability scale saturation indices

Items	Saturation indices	Number of items	Number and nomination of factors	Cronbach's Alpha
Getting infected with hepatitis infection (B or C)	.674	10	Perceived hospital risk probability	.91
Getting injury from sharps (blades etc.)	.765			
Contracting Lassa fever infection	.514			
Contacting HIV	.695			
Getting needle stick injury	.751			
Contracting tuberculosis	.778			
Having splash of biological fluid (blood and bodily fluid)	.783			
Physical attack from patients and relatives	.810			
Psychological distress	.616			
Injuries from falls that may lead to fracture or bruises	.583			

Table 39

KMO index and Bartlett's test of the scale for perceived risk probability

Kaiser-Meyer-Olkin Measures of sampling Adequacy		.914
Bartlett's test of Sphericity	Approx. Chi Square	3153.216
	df	45
	Significance	.000

KMO index has satisfactory value of .912 and the Barlett test is significant $P < .001$

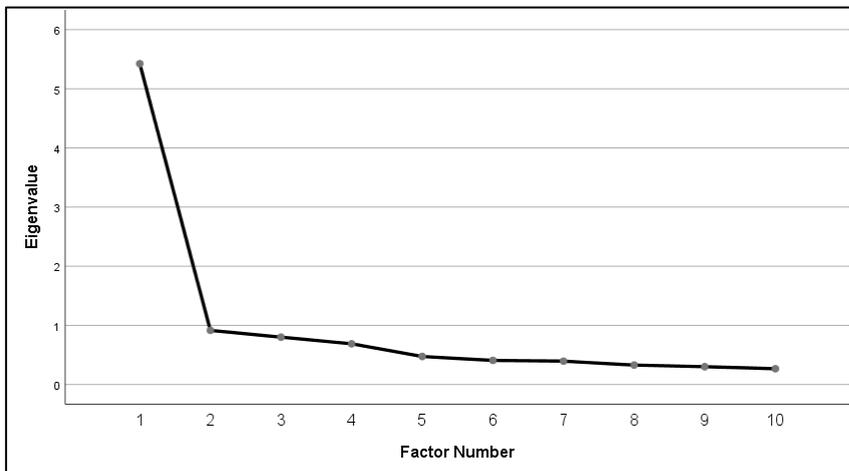


Figure 55: Eigenvalue diagram

Table 40

Reliability of the scale for perceived risk probability (PERP) if an item is deleted

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
PERP 1	24.78	73.834	.633	.456	.897
PERP 2	25.44	72.745	.721	.581	.891
PERP 3	25.84	78.324	.486	.302	.905
PERP 4	25.35	73.978	.651	.491	.896
PERP 5	24.91	72.338	.708	.564	.892
PERP 6	24.79	70.192	.731	.591	.890
PERP 7	24.95	71.293	.732	.601	.890
PERP 8	25.19	71.404	.756	.618	.889
PERP 9	25.17	73.357	.611	.475	.898
PERP 10	25.01	74.146	.576	.443	.901

Annex 10

Results of exploratory factor analysis of the scale measuring perceived risk

severity of risks

Table 41

Perceived risk severity scale saturation indices

Items	Saturation indices	Number of items	Number and nomination of factors	Cronbach's Alpha
Contacting HIV	.632	10	Perceived hospital risk severity	.94
Getting infected with hepatitis infection (B or C)	.854			
Getting needle stick injury	.762			
Contracting tuberculosis	.835			
Contracting Lassa fever infection	.834			
Getting injury from sharps (blades etc.)	.820			
Injuries from falls that may lead to fracture or bruises	.798			
Physical attack from patients and relatives	.843			
Having splash of biological fluid (blood and bodily fluid)	.693			
Psychological distress	.638			

Table 42

KMO index and Bartlett's test of the scale of perceived risk severity

Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO)		.924
Bartlett's Test of Sphericity	Approx. Chi Square	4752.904
	Df	45
	Sig.	.000

KMO index has an excellent value of .924 and the Bartlett test is significant $P < .001$

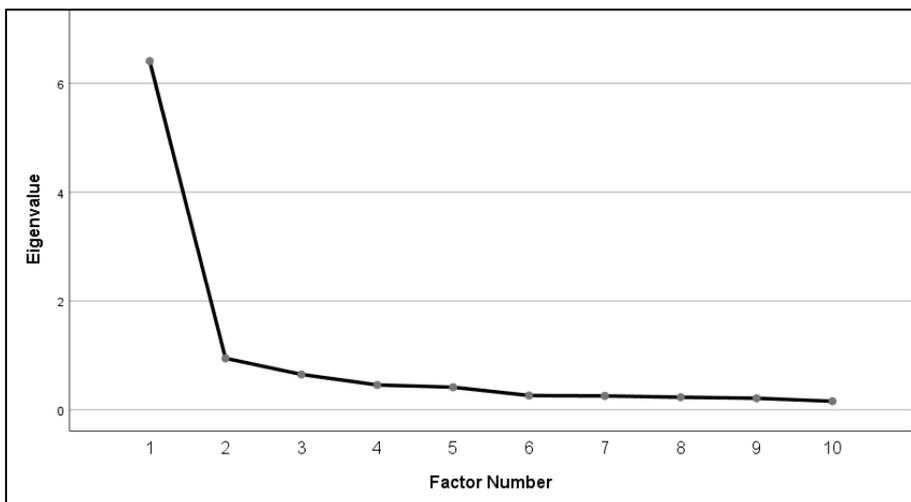


Figure 56: Eigenvalue diagram

Table 43

Reliability of the scale for perceived risk severity (PERS) if an item is deleted

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
PERS 1	32.80	92.832	.627	.440	.936
PERS 2	32.23	88.084	.800	.717	.927
PERS 3	32.83	90.029	.736	.590	.931
PERS 4	32.36	88.996	.784	.706	.928
PERS 5	32.43	88.832	.814	.752	.927
PERS 6	32.02	90.665	.766	.696	.929
PERS 7	32.50	89.339	.782	.723	.928
PERS 8	32.20	89.893	.792	.697	.928
PERS 9	32.73	90.337	.708	.624	.932
PERS 10	32.80	91.979	.652	.579	.935

Annex 11

Results of exploratory factor analysis of the scale measuring perceived risk controllability of risks

Table 44

Perceived risk controllability scale saturation indices

Items	Saturation indices	Number of items	Number and nomination of factors	Cronbach's Alpha
Getting injury from sharps (blades etc.)	.693	10	Perceived hospital risk controllability	.92
Contacting HIV	.797			
Getting needle stick injury	.707			
Getting infected with hepatitis infection (B or C)	.771			
Contracting tuberculosis	.797			
Injuries from falls that may lead to fracture or bruises	.670			
Having splash of biological fluid (blood and bodily fluid)	.807			
Contracting Lassa fever infection	.776			
Physical attack from patients and relatives	.638			
Psychological distress	.618			

Table 45

KMO index and Bartlett's test of the scale of perceived risk controllability

Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO)		.903
Bartlett's Test of Sphericity	Approx. Chi Square	3800.258
	Df	45
	Sig.	.000

KMO index has an excellent value of .903 and the Bartlett test is significant $P < .001$

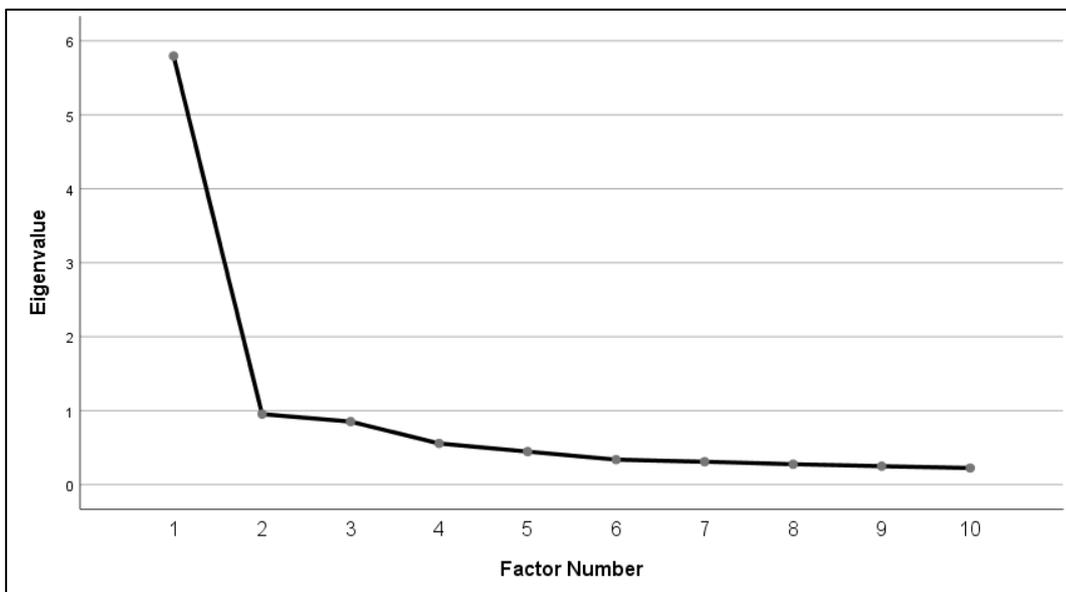


Figure 57: Eigenvalue diagram

Table 46

Reliability of the scale for perceived controllability of risk (PERC) if an item is deleted

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
PERC1	31.70	70.120	.653	.525	.911
PERC2	31.35	68.931	.754	.633	.906
PERC3	31.76	70.025	.675	.530	.910
PERC4	31.57	69.192	.730	.605	.907
PERC5	31.63	68.749	.753	.636	.906
PERC6	31.62	70.473	.624	.554	.913
PERC7	31.71	68.642	.760	.660	.905
PERC8	31.47	70.541	.735	.627	.907
PERC9	32.04	69.790	.639	.573	.912
PERC10	32.15	70.107	.623	.560	.913

Annex 12

Results of exploratory factor analysis of the scale measuring perceived effectiveness of preventive actions

Table 47

Perceived effectiveness of preventive actions' scale saturation indices

Items		Number of items	Factor nomination	Cronbach's Alpha
Providing water facilities for hand washing	.788	8	Perception of preventive actions	.92
Providing equipment for disposing sharps and other wastes	.742			
Training and sensitizing health workers	.791			
Providing personal safety equipment	.669			
Participating in training	.815			
Arranging the hospital environment	.748			
Using personal protective equipment	.825			
Establishing good relationship with patients	.753			

Table 48

KMO index and Bartlett's test of the scale of perceived effectiveness of preventive actions

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.919
Bartlett's Test of Sphericity	Approx. Chi-Square	3067.122
	df	28
	Sig.	.000

KMO index has high satisfactory value of .919 and the Bartlett test is significant $P < .001$

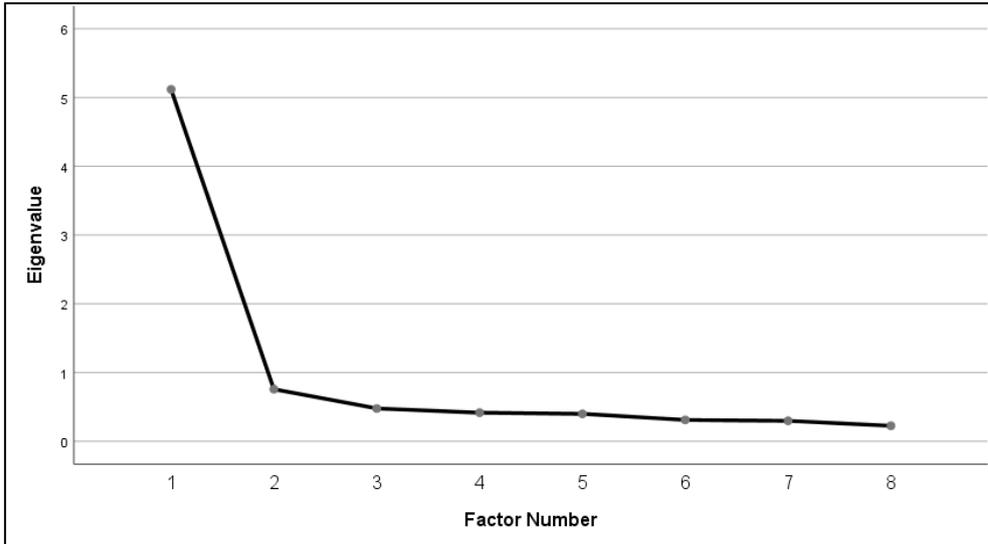


Figure 58: Eigenvalue diagram

Table 49

Reliability of perceived effectiveness of preventive actions (PPA) scale if an item is deleted

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
PPA1	30.14	24.965	.741	.667	.906
PPA2	30.02	26.660	.705	.606	.909
PPA3	30.00	26.502	.750	.582	.905
PPA4	30.42	25.943	.645	.457	.914
PPA5	30.04	25.966	.771	.616	.903
PPA6	30.33	25.485	.723	.563	.907
PPA7	30.03	25.596	.783	.627	.902
PPA8	30.15	25.863	.722	.547	.907

Annex 13

Results of exploratory factor analysis of the scale measuring safety behaviour

Table 50

Safety behaviour scale saturation indices

Items	Saturation indices	Number of items	N° and nomination of factors	Cronbach's Alpha
When there are emergency situations, I get my job done not minding the standard operation procedure	.423	5	Factor1 unsafe behaviour towards hospital risk	.65
I don't mind my rapport with patients, I care more about getting the job done	.686			
When personal protective equipment is not available, I go on to handle cases	.533			
When I am tired, I take an exciting to stay awake until I finish my work for the day	.568			
When there is no safety box close to me, I use any dustbin around me to dispose needle or sharps	.401			
When I predict violence situation, I ensure the presence of a security officer	.644	4	Factor 2 Safety behaviour towards hospital risk	.61
I use equipment only when they are sterilized	.489			
Each time I resume duty, I look out for risk factors at work	.525			
When examining a patient, I avoid close contact with the patient	.465			

Table 51

KMO index and Bartlett's test of the scale of safety behaviour

Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO)		.704
Bartlett's Test of Sphericity	661.756	586.312
	df.	.36
	Sig.	.000

KMO has an acceptable index value of .676 and the Bartlett test is significant $P < .001$

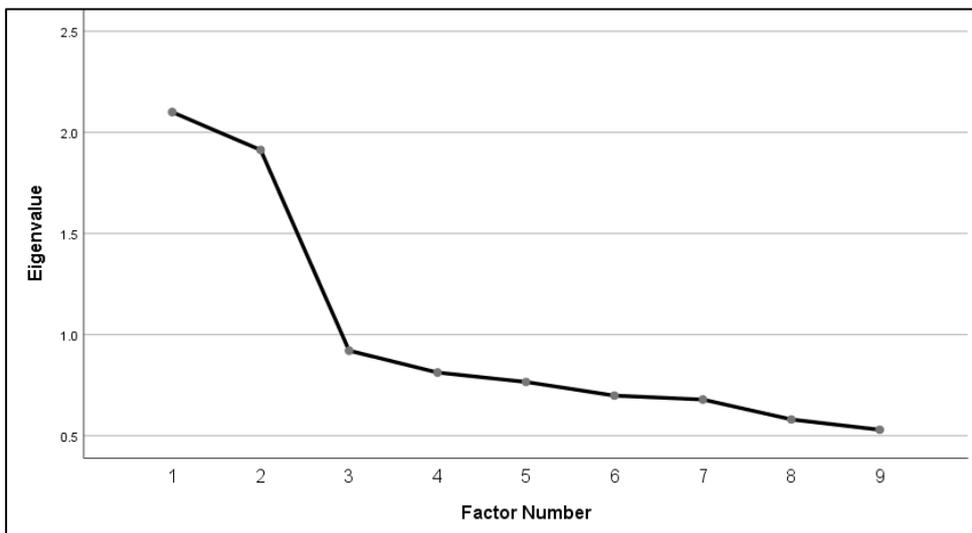


Figure 59: Eigenvalue diagram

Table 52

Reliability of safety behaviour (SB) scale if an item is deleted

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
SB3	14.33	10.372	.318	.145	.629
SB5	14.23	8.870	.509	.280	.535
SB7	14.00	9.757	.409	.208	.587
SB9	14.06	9.593	.433	.205	.576
SB13	14.13	9.961	.328	.125	.627
SB6	10.05	4.854	.452	.205	.495
SB8	10.15	5.663	.385	.150	.549
SB12	9.84	5.606	.381	.149	.552
SB14	10.79	5.661	.356	.128	.569

Annex 14

Results of the confirmatory factor analysis of the scale measuring naive causal explanation of accident

Lavaan 0.6-10 ended normally after 27 iterations		
Estimator	ML	
Optimization method	NLMINB	
Number of model parameters	19	
Number of observations	611	
Model Test User Model:		
	Standard	Robust
Test Statistic	177.362	118.356
Degrees of freedom	26	26
P-value (Chi-square)	0.000	0.000
Scaling correction factor		1.499
Yuan-Bentler correction (Mplus variant)		
Model Test Baseline Model:		
Test statistic	2142.047	1430.184
Degrees of freedom	36	36
P-value	0.000	0.000
Scaling correction factor		1.498
User Model versus Baseline Model:		
Comparative Fit Index (CFI)	0.928	0.934
Tucker-Lewis Index (TLI)	0.900	0.908
Robust Comparative Fit Index (CFI)		0.934
Robust Tucker-Lewis Index (TLI)		0.908
Loglikelihood and Information Criteria:		
Loglikelihood user model (H0)	-7010.862	-7010.862
Scaling correction factor for the MLR correction		1.264
Loglikelihood unrestricted model (H1)	NA	NA
Scaling correction factor for the MLR correction		1.399
Akaike (AIC)	14059.725	14059.725

Bayesian (BIC)	14143.611	14143.611
Sample-size adjusted Bayesian (BIC)	14083.290	14083.290
Root Mean Square Error of Approximation:		
RMSEA	0.098	0.076
90 Percent confidence interval - lower	0.084	0.065
90 Percent confidence interval - upper	0.111	0.065
P-value RMSEA <= 0.05	0.000	0.000

Robust RMSEA		0.093
90 Percent confidence interval - lower		0.077
90 Percent confidence interval - upper		0.111

Standardized Root Mean Square Residual:		
SRMR	0.048	0.048

Parameter Estimates:		
Standard errors		Sandwich
Information bread		Observed
Observed information based on		Hessian

Latent Variables:						
	Estimate	Std.Err	z-value	P(> z)	Std.lv	Std.all
Internal =~						
Int_1	1.000				0.650	0.644
Int_2	0.966	0.075	12.940	0.000	0.628	0.667
Int_3	1.118	0.071	15.734	0.000	0.727	0.730
Int_4	1.201	0.084	14.283	0.000	0.781	0.603
Int_5	1.027	0.072	14.270	0.000	0.668	0.643
Int_6	1.083	0.086	12.646	0.000	0.704	0.658
External =~						
EXT_1	1.000				0.682	0.715
EXT_2	1.095	0.062	17.655	0.000	0.747	0.736
EXT_3	1.029	0.059	17.337	0.000	0.701	0.677

Covariances:						
	Estimate	Std.Err	z-value	P(> z)	Std.lv	Std.all
Internal ~~						
External	0.419	0.044	9.601	0.000	0.946	0.946

Variances:						
	Estimate	Std.Err	z-value	P(> z)	Std.lv	Std.all
.Int_1	0.595	0.044	13.660	0.000	0.595	0.585
.Int_2	0.491	0.037	13.220	0.000	0.491	0.555
.Int_3	0.464	0.037	12.660	0.000	0.464	0.468
.Int_4	1.068	0.070	15.250	0.000	1.068	0.636

.Int_5	0.631	0.050	12.548	0.000	0.631	0.586
.Int_6	0.650	0.054	12.123	0.000	0.650	0.567
.EXT_1	0.445	0.047	9.450	0.000	0.445	0.489
.EXT_2	0.473	0.043	10.943	0.000	0.473	0.459
.EXT_3	0.582	0.052	11.218	0.000	0.582	0.542
Internal	0.423	0.054	7.830	0.000	1.000	1.000
External	0.465	0.062	7.511	0.000	1.000	1.000
R-Square:						
	Estimate					
Int_1	0.415					
Int_2	0.445					
Int_3	0.532					
Int_4	0.364					
Int_5	0.414					
Int_6	0.433					
EXT_1	0.511					
EXT_2	0.541					
EXT_3	0.458					

Résumé étendu de la thèse

Croyances, explication naïve (spontanée) des accidents, perception du risque, perception des actions préventives et comportement en matière de sécurité des travailleurs de secteur d'hospitalier au Nigéria.

Beliefs, Spontaneous (naive) explanation of accidents, risk perception, perception of preventive actions and safety behaviour among health care workers in Nigerian hospitals

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1. Introduction

Les risques et les accidents du personnel hospitalier nigérian constituent une menace pour leur santé et leur sécurité; ce qui nécessite une plus grande attention envers la prévention et la gestion des risques. Au fil des années, dans des conditions de travail normales et à chaque incidence de pandémie ou d'épidémie d'infections endémiques, le gouvernement nigérian a la responsabilité de garantir la vie et la sécurité des membres du personnel hospitalier (MPH). Il s'efforce de sensibiliser les membres du personnel hospitalier aux protocoles de sécurité et de leur fournir les équipements de protection individuelle (EPI) nécessaires. Dans certains cas, des formations sont organisées afin de transmettre aux travailleurs de santé les connaissances nécessaires et de les guider sur la meilleure façon de se protéger des risques sanitaires.

Ces actions n'ont pas diminuer significativement l'exposition des membres du personnel hospitalier aux risques de maladies et d'accidents sur le lieu de travail. Nous pouvons être amenés à penser que les actions systématiques de la direction de l'hôpital sur la sécurité des membres du personnel hospitalier ne sont peut-être pas suffisantes pour maintenir une approche préventive efficace. D'où la nécessité d'une analyse plus approfondie des facteurs susceptibles de compromettre l'efficacité des mesures de prévention des accidents dans les hôpitaux.

Cela rend pertinent le fait de démêler les causes des accidents pour une analyse et une prévention efficace visant à modifier le comportement des travailleurs. Kouabenan (2009) a démontré l'efficacité de la prévention des accidents en reconnaissant les représentations individuelles sur le risque auquel ils sont confrontés et leurs caractéristiques personnelles comme des facteurs pouvant influencer le comportement

des personnes. Vraisemblablement, de nombreux facteurs sont susceptibles d'expliquer le comportement du personnel hospitalier dans les hôpitaux nigériens. Essentiellement, nous pouvons comprendre le comportement du personnel hospitalier à partir de leurs processus psychologiques et des facteurs explicatifs des attitudes du personnel hospitalier qui font face à des situations à risque. Par conséquent, nous allons examiner les croyances du personnel hospitalier, leur perception des risques, leur explication causale naïve ou spontanée des accidents, leur perception des actions de prévention et l'effet de ces processus psychologiques sur leurs comportements de sécurité.

1.1. Objectifs de l'étude

Cette thèse vise à examiner la relation entre les croyances (fatalistes, de contrôle et normatives), l'explication naïve de l'accident, la perception du risque, la perception des actions préventives et le comportement de protection. Ces objectifs sont développés en deux parties.

1.1.1. La première partie couvre l'examen théorique et est décrite comme suit

- Un examen théorique de l'étude qui vise 1) à expliquer en détail la prévalence des accidents hospitaliers, les diverses stratégies rencontrées pour sauver le problème de la sécurité sanitaire des travailleurs de santé au Nigeria et les problèmes qui entravent la mise en œuvre efficace de ces initiatives préventives. 2) présenter un examen approfondi des explications naïves des accidents en tant que construction psychologique qui peut être intégrée dans l'étude du comportement face au risque. 3) Examiner le rôle de la perception du risque sur le comportement en se concentrant sur la gravité perçue du risque, la

probabilité du risque et la contrôlabilité du risque et examiner les variations du risque perçu en fonction des caractéristiques du risque et des caractéristiques psychosociales de la personne qui le perçoit. 4) savoir comment les croyances peuvent affecter le comportement de sécurité, l'efficacité perçue des actions préventives, la perception du risque, et l'explication naïve des accidents.

1.1.2. La deuxième partie des objectifs de cette thèse se concentre sur les analyses empiriques et vise à:

- 1) étudier les perceptions du personnel hospitalier sur les risques dans leur lieu de travail, leurs explications causales naïves des accidents, leurs croyances et comportements de sécurité adoptés pour gérer les risques, en utilisant les entretiens comme outil d'enquête. 2) analyser le rôle des croyances sur l'efficacité perçue des actions de prévention et des comportements de sécurité des membres du personnel hospitalier dans l'hôpital. 3) voir comment les explications causales naïves affectent l'efficacité perçue des actions de prévention et le comportement de sécurité des membres du personnel hospitalier. 4) déterminer comment la perception du risque affecte l'efficacité perçue des actions de prévention et le comportement de sécurité des membres du personnel hospitalier et 5) analyser le lien entre les croyances, l'explication naïve des accidents, la perception du risque et les comportements de sécurité.

2. Problématique de l'étude

Les activités du personnel hospitalier ont pour but de sauver des vies et de rétablir une santé défaillante. Néanmoins, ces activités sur leur lieu de travail les exposent à différentes formes de risques comme les risques biologiques (e.g., contracter des

infections et des maladies), les risques physiques (e.g., être victime d'une agression ou d'une chute), etc. En raison de cette situation de travail à haut risque, des organismes de réglementation de la santé et de la sécurité organisationnelles (e.g., l'Organisation internationale du travail (OIT) et l'Organisation mondiale de la santé (OMS) sont mis en place les actions pour assumer des responsabilités censées modérer les dangers liés au travail et les risques organisationnels. En effet, les accidents du travail sont toujours un sujet de préoccupation car les rapports annuels sur les incidences du travail sont toujours en augmentation (Alli, 2008). Les différentes données disponibles sur les risques et les accidents du personnel hospitalier (Isara et al., 2015 ; Ogoina et al., 2014) démontrent que ces derniers sont confrontés quotidiennement à plusieurs formes de risques physiques et sanitaires. Par exemple, nous avons constaté dans l'étude de Weddle (1996) auprès des travailleurs des services hospitaliers que tous les participants ont été victimes des accidents du travail. Ces menaces pour leur santé représentent des défis pour la vie et le bien-être du personnel hospitalier, capables de limiter les réalisations proposées par l'organisation et de causer une perte économique drastique (McLain & Jarrell, 2007 ; Nahrgang et al., 2011). Au Nigeria, Isara et Ofili (2012) ont souligné que le personnel hospitalier nigériens est constamment exposé au risque d'accident du travail et de maladie professionnelle en raison de la nature de son travail. Ils sont fréquemment exposés à des pratiques à risque (e.g., l'utilisation d'aiguilles et d'objets tranchants) et au contact direct avec des patients souffrant de différents types d'affections et d'autres défis d'événements qui peuvent survenir dans le cadre de leur travail. En outre, Amosun et al. (2011) ont affirmé que l'imprudence, la négligence et la mauvaise connaissance des compétences opérationnelles des établissements de santé modernes sont observées dans les hôpitaux nigériens. Ces affirmations ont suscité notre curiosité sur le fait que divers facteurs

pourraient être responsables des accidents du personnel hospitalier. Par conséquent, pour mieux comprendre la situation des accidents dans les hôpitaux nigériens, cette thèse a pour but d'explorer les facteurs qui favorisent les accidents dans le secteur de la santé, afin de contribuer à des mesures de prévention plus durables.

Fondamentalement, l'efficacité des mesures de prévention des accidents dans le secteur de la santé est discutable. Ngwama (2016) estime que ces mesures pourraient avoir été sabotées par la complaisance des gouvernements dans le traitement des travailleurs défaillants et la surveillance des activités des employés. Pour Amosun et al. (2011), les activités indifférentes le personnel hospitalier pourraient être responsables des situations d'accident dans les hôpitaux. Par exemple, Markovic-Denic, et al. (2015) signalent que les membres du personnel hospitalier font preuve de non-respect des règles de sécurité et d'un refus remarquable de signaler les accidents pour obtenir une assistance médicale. En plus de ces justifications, Kouabenan (2014) note que les accidents du travail peuvent être dus à une mauvaise communication sur les risques entre les travailleurs et le ou les employeurs. En substance, on ne peut pas s'appuyer uniquement sur les réglementations et les politiques de sécurité pour expliquer les incidences et les comportements de sécurité des travailleurs. Par conséquent, pour un processus de développement d'une mesure préventive améliorée, il sera impératif de ne pas considérer uniquement les facteurs techniques mais aussi les facteurs relatifs aux travailleurs de santé eux-mêmes, leurs croyances, leur explications causales naïves des accidents, leur perception du risque, leur perception des actions prévention et comment ces facteurs pourraient encourager ou décourager les pratiques de sécurité.

3. Méthodologie

3.1. Participants

Un échantillon de 611 membres du personnel hospitalier, comprenant des médecins, des infirmières et des scientifiques/technologues de laboratoire, sont participés à notre l'étude. Les travailleurs de la santé sont recrutés dans des hôpitaux publics et privés de la métropole de trois États de la zone géopolitique du sud-est du Nigeria : Anambra, Abia et Ebonyi.

3.2 . Matériel

Les échelles permettant de mesurer les 8 variables de l'étude sont validées à l'aide d'une analyse factorielle exploratoire (AFE). Elles comprennent l'échelle de mesure des croyances fatalistes, l'échelle de mesure des croyances de contrôle et l'échelle de mesure des croyances normatives, l'échelle de mesure de la perception du risque, l'échelle de mesure de l'efficacité perçue des mesures de prévention et l'échelle de mesure de comportement de sécurité. L'échelle mesurant l'explication naïve est validée par une analyse factorielle confirmatoire (AFC). Ces échelles présentent des caractéristiques psychométriques satisfaisantes et ont toutes obtenu des indices de fiabilité acceptables.

3.3. Procédure

L'élaboration du questionnaire est faite sur la base de l'étude exploratoire, des connaissances issues de la littérature sur les différentes variables (croyances, perception des mesures de prévention et comportement de sécurité). L'étude exploratoire a été réalisée à l'aide d'un guide d'entretien semi-directif, comportant 22 questions (voir annexe 2, p. 355). Les entretiens ont été menés auprès de 45 membres du personnel hospitalier (médecins, infirmiers, techniciens de laboratoire/scientifiques). La durée moyenne des entretiens est de 20 minutes. Les items du questionnaire ont été élaborés à partir des résultats de l'analyse des données issues des entretiens et de notre connaissance des différents concepts théoriques issus de la littérature (voir Annexe 5, p. 359). Une validité apparente d'abord été réalisée par le directeur de thèse et mes collègues doctorants du laboratoire de psychologie (LIP/PC2S). De plus, un pré-test a également été réalisé auprès de 35 membres du personnel hospitalier afin de vérifier la clarté des items de notre questionnaire avant le distribuer. Les données ont été collectées sur le lieu de travail du personnel hospitalier. Avant la distribution du questionnaire final, 4 étudiants diplômés de l'université fédérale Alex Ekwueme ont été recrutés et formés pour nous aider à la collecte des données. Leur participation visait à faciliter le processus de la collecte des données et à obtenir le plus grand nombre possible des participants. Les enquêteurs ont été rémunérés pour leur participation. Au moment de la distribution du questionnaire, les approbations ont d'abord été obtenues auprès des chefs de service ou des superviseurs en poste avant que le personnel hospitalier ne soient pas approché pour obtenir leur participation volontaire et leur consentement. Ces agents ont été rencontrés dans les différentes sections de l'hôpital, notamment dans les services, les laboratoires, les salles

de consultation, les salles de séminaire, et les salles d'appel, etc. La durée moyenne de remplir le questionnaire est 1h. Avant que les participants ne remplissent le questionnaire, les enquêteurs ont présenté le but de la recherche. L'attention des participants a été attirée par les instructions figurant sur la première ligne de chaque échelle. Tous les participants ont lu et rempli le questionnaire de manière indépendante tandis que les enquêteurs sont restés pour superviser le questionnaire et s'assurer qu'il était bien rempli. Chaque échelle du questionnaire était présentée avec une série d'instructions sur la façon de la remplir et sur la signification du point de Likert. À la fin du questionnaire, des questions sociodémographiques ont été ajoutées, telles que l'âge, le sexe, le niveau d'éducation, la catégorie professionnelle, etc.

Le tri et les analyses des données ont été réalisés à l'aide des logiciels SPSS V.25 et R version 4.1.2. Avant d'analyser les hypothèses, nous avons procédé à une analyse descriptive afin de résumer les données pour chaque variable. L'analyse descriptive comprend les moyennes, les écarts types, les fréquences et les pourcentages. Différents tests statistiques ont été appliqués pour tester nos hypothèses. Une analyse de corrélation est effectuée pour tester la relation entre les variables de l'étude et les variables de contrôle (âge, sexe, niveau d'éducation, etc.). Des analyses de régression linéaire multiple ont été utilisées pour tester les liens entre les variables indépendantes et les variables dépendantes. Les variables sociodémographiques ont été introduites comme variables de contrôle dans les modèles de régression linéaire.

4. Résultats

4.1. L'étude exploratoire

L'analyse thématique a permis d'identifier les catégories de risques auxquels le personnel hospitalier est confronté au travail, à savoir les risques biologiques (e.g., le risque d'infection par les fluides corporels : VIH, la tuberculose, l'hépatite B ou C), les risques physiques (e.g., les blessures par des objets tranchants), les risques liés aux mauvaises pratiques (e.g., les risques de complications dans la pratique) et les risques psychologiques résultant d'un traumatisme. En outre, les résultats fondamentaux de l'explication des accidents montrent que la négligence du personnel hospitalier le non-respect des règles sont les principales causes d'accident dans le secteur de la santé. Ces explications montrent également que du personnel hospitalier expliquent les accidents par des causes internes (e.g., le manque de formation, la non-utilisation des équipements de sécurité) et des causes externes (e.g., un sol mouillé, le manque d'équipements de sécurité). En outre, les croyances fatalistes (e.g., l'accident est prédéterminé) et les croyances de contrôle (e.g., l'accident peut être contrôlé) sont les principales croyances qui ont été identifiées parmi le personnel hospitalier.

4.2. Vérification des hypothèses générales

Les résultats de l'étude quantitative sont présentés en quatre parties :

4.2.1. Rôle des croyances (croyances fatalistes, croyances de contrôle et croyances normatives) sur le comportement de sécurité et sur la perception des actions préventives

Concernant l'effet des croyances fatalistes sur les comportements de sécurité, nous avons observé que le personnel hospitalier qui ont des croyances fatalistes élevées adoptent moins de comportements de sécurité. De même, les résultats montrent que les croyances fatalistes sont négativement liées à la perception des actions de prévention. Ces résultats valident notre hypothèse H1 et H2 qui stipulent que plus les agents de santé possèdent des croyances fatalistes, moins ils accorderont d'attention au comportement sécuritaire que ceux qui ont peu de croyances fatalistes et plus ils perçoivent les actions de prévention comme moins efficaces.

D'autre part, on observe que les croyances de contrôle prédisent positivement la perception des actions de prévention. Ceci confirme l'hypothèse H4 qui prédit qu'un sentiment élevé de contrôle des risques hospitaliers sera positivement lié à la perception de l'efficacité des actions de prévention.

Nous avons constaté également que les croyances normatives ne prédisent pas significativement le comportement de sécurité. Par conséquent, l'hypothèse H5 n'a pas été confirmée. Par contre, les résultats montrent que les croyances normatives prédisent significativement la perception de l'efficacité des actions de prévention. Ce résultat confirme notre hypothèse H6 selon laquelle, plus les travailleurs acceptent d'adhérer à

l'opinion ou à l'attente des personnes importantes, plus ils percevront les mesures de prévention comme efficaces. Par conséquent, l'hypothèse H6 est confirmée.

4.2.2. Rôle des explications causales sur les comportements de sécurité et l'efficacité perçue des actions de prévention

L'analyse de régression montre une relation non significative entre les explications causales et les comportements de sécurité. L'analyse de régression montre que des explications causales naïves des accidents du travail à l'hôpital est négativement lié à l'efficacité perçue des actions préventives. Ceci indique que lorsque le personnel hospitalier fournit des explications causales externes aux accidents de travail hospitaliers, ils tendent à moins percevoir l'efficacité des actions de prévention. Ce résultat est à l'encontre de notre hypothèse H8 selon laquelle l'explication causale interne prédit positivement l'efficacité perçue des actions préventives. Cela signifie que plus le personnel hospitalier explique l'accident par des facteurs externes, moins ils perçoivent l'efficacité des actions de prévention.

4.2.3. Effet de la perception des risques (probabilité, gravité et contrôlabilité) sur les comportements de sécurité et sur la perception des actions préventives.

4.2.3.1. Effet de la perception des risques sur les comportements de sécurité

Nous n'avons pas observé de relation significative entre la perception de la probabilité du risque et le comportement de sécurité. D'autre part, il existe un lien positif significatif entre la gravité perçue du risque et le comportement de sécurité. Cela signifie

que plus les agents de santé perçoivent la gravité du risque, plus ils adoptent un comportement sécuritaire. En revanche, la relation entre la contrôlabilité perçue du risque et le comportement de sécurité n'est pas significative. Plus précisément, les résultats confirment notre hypothèse H9b indiquant que plus le personnel hospitalier reconnaît la gravité des conséquences des risques au travail, plus ils adoptent un comportement sécuritaire. Nos hypothèses H9a et H9c n'ont pas été confirmées.

4.2.3.2. Effet de la perception du risque sur la perception des actions préventives

Les résultats de notre analyse montrent un lien positif et statistiquement significatif entre la probabilité perçue du risque et l'efficacité perçue des actions de prévention. La gravité perçue du risque prédit également l'efficacité perçue des actions de prévention. En d'autres termes, lorsque les agents de santé perçoivent la probabilité du risque élevée et la gravité du risque élevée, ils tendent à percevoir que les actions de prévention sont efficaces. Ce résultat est contraire à nos hypothèses H10a et H10b, qui stipulent qu'une perception élevée de la probabilité et de la gravité du risque sera négativement associée à la perception de l'efficacité des actions préventives. Nous avons également observé un lien positif et significatif entre la perception de la contrôlabilité du risque et la perception de l'efficacité des actions préventives. Par conséquent, notre hypothèse H10c a été validée, indiquant que la contrôlabilité perçue du risque est positivement liée à l'efficacité perçue des actions de prévention. Ainsi, lorsque le personnel hospitalier perçoit que le risque est contrôlable, ils tendent à avoir une efficacité perçue élevée des actions de prévention.

4.2.4. Relation entre les croyances, les explications causales naïves des accidents, la perception du risque et le comportement en matière de sécurité : test des effets médiateurs

4.2.4.1. Lien entre les croyances (fatalistes, contrôle et normatives) et les explications causales de l'accident

Pour tester la relation entre le fatalisme et les explications causales, notre hypothèse (H11) propose que les travailleurs donnent plus d'explications causales externes lorsqu'ils sont fatalistes que lorsqu'ils ne le sont pas. Dans ce cas, les croyances fatalistes sont la variable indépendante (IV) tandis que l'explication causale externe est la variable dépendante (DV). Le score d'internalité de l'explication causale naïve est positivement lié aux croyances fatalistes. Ce résultat est à l'encontre de notre hypothèse H11 selon laquelle du personnel hospitalier fatalistes expliqueront l'accident par des facteurs externes.

En plus, l'analyse de régression des croyances de contrôle et du score d'internalité de l'explication causale naïve n'a montré aucune relation significative entre les croyances de contrôle et les explications causales naïves des accidents. Par conséquent, notre hypothèse selon laquelle les croyances de contrôle prédisent l'explication causale interne n'est pas confirmée (H12). De plus, nous testons l'hypothèse selon laquelle du personnel hospitalier qui ont des croyances élevées en matière d'attentes comportementales des autres référents, fourniront plus d'explications causales internes (H13). Le résultat de l'analyse de régression entre les croyances normatives et les explications causales n'est pas significatif. Par conséquent, notre hypothèse H13 n'est pas confirmée.

4.2.4.2. Lien entre les croyances (fatalistes, contrôle, normatives) et la perception du risque

Nous avons observé une relation non significative entre les croyances fatalistes et la probabilité de risque perçue, la gravité du risque perçu, et la contrôlabilité du risque perçu. Par conséquent, nos hypothèses H14a, H14b et H14c selon lesquelles les croyances fatalistes seront négativement corrélées à la perception du risque ne sont pas validées.

En outre, notre analyse montre un lien non significatif entre les croyances de contrôle et la probabilité de risque perçue. De plus, nous avons observé une relation positive et statistiquement significative entre les croyances de contrôle et la gravité perçue du risque. De même, le lien entre les croyances de contrôle et la contrôlabilité perçue du risque est positif et statistiquement significatif. Par conséquent, l'hypothèse H15a n'a pas été confirmée, tandis que l'hypothèse H15b était contraire à notre hypothèse selon laquelle des croyances de contrôle élevées seront liées à une faible gravité du risque perçu. De plus, le contrôle perçu est positivement et significativement lié à la gravité du risque perçu. L'hypothèse H15c est également confirmée et conforme à notre hypothèse selon laquelle plus du personnel hospitalier croient qu'ils possèdent la capacité de gérer le risque professionnel, plus ils perçoivent que les risques hospitaliers sont contrôlables.

Concernant les croyances normatives, nos résultats indiquent que les croyances normatives sont positivement et statistiquement significatives avec la probabilité de risque perçue, la perception de la gravité du risque est liée tendanciellement à la contrôlabilité perçue du risque. Les hypothèses H16a et H16b ont été confirmées, montrant que du personnel hospitalier qui ont des croyances normatives élevées ont tendance à percevoir la probabilité et la gravité du risque. De plus, l'hypothèse H16c montre un effet tendanciel indiquant que du personnel hospitalier qui ont des croyances

normatives élevées sont susceptibles d'avoir une perception élevée de la contrôlabilité du risque.

4.2.4.3. Relation entre la perception du risque et les explications causales

L'analyse de l'effet du score d'internalité de l'explication causale naïve et de la probabilité du risque perçue est positivement significative. Ceci confirme notre hypothèse H17a selon laquelle la perception de la probabilité d'un risque hospitalier sera liée à des explications causales internes. De même, il existe une relation significative entre la gravité perçue du risque et l'explication causale naïve. Cela signifie que plus les risques hospitaliers sont perçus comme graves, plus le rôle du personnel soignant est cité dans l'explication de l'accident du travail hospitalier. Ceci confirme notre hypothèse H17b. En revanche, il n'y a pas de relation significative entre la contrôlabilité perçue du risque et les explications causales naïves. Par conséquent, l'hypothèse H17c n'est pas confirmée.

5. Discussion

L'objectif de cette thèse est d'explorer la relation entre les croyances (fatalistes, de contrôle, normatives), l'explication naïve de l'accident, la perception du risque, l'efficacité perçue des mesures prévention et le comportement de sécurité. L'étude a été réalisée en deux phases, par entretien et par questionnaire. Les résultats généraux seront discutés respectivement dans les rubriques suivantes.

Comprendre les risques et les accidents dans les hôpitaux nigériens à travers l'analyse exploratoire des explications naïves des accidents hospitaliers par le personnel hospitalier

Un aperçu de l'étude exploratoire révèle que la situation d'accident peut être explicitement comprise à travers la perception des risques des travailleurs et leurs explications causales naïves de l'accident. Ainsi, nous avons établi que les risques perçus par le personnel hospitalier sur leur lieu de travail (risques biologiques, risques physiques, risques psychologiques, etc.) corroborent avec les catégories de risques hospitaliers telles que décrites dans la littérature scientifique (United States Department of Labor, 2019). De plus, l'analyse des explications causales de l'accident données par le personnel soignant soutient le modèle d'explication naïve de l'accident de Kouabenan (1999) qui révèle que des facteurs internes et externes sont donnés pour expliquer les situations d'accident à l'hôpital. En suivant la catégorisation des attributions causales de Weiner (1979, 1985), nous avons également distingué les attributions causales contrôlables et incontrôlables des causes internes et externes de l'accident à partir des réponses des travailleurs de la santé. Ces résultats sur le modèle d'attribution causale de l'accident hospitalier par le personnel hospitalier indiquent que les explications naïves de l'accident peuvent être favorables dans l'analyse et la prévention des accidents. D'après les résultats de notre analyse, nous avons généralement enregistré que les membres du personnel hospitalier ont donné un peu plus de facteurs externes pour expliquer l'accident sur leur lieu de travail. Cependant, les causes d'accident les plus souvent citées sont l'attention suffisante pour éviter les dommages (négligence) et les pratiques de sécurité inadéquates, qui sont des facteurs de causalité internes.

En ce qui concerne la perception des risques liés au travail hospitalier, nous avons pu distinguer trois caractéristiques de la perception des risques : la probabilité perçue du risque, la gravité perçue du risque et la contrôlabilité perçue du risque. Ce résultat de l'analyse exploratoire visant à comprendre la perception des risques par les travailleurs hospitaliers est en accord avec le modèle psychométrique (Slovic, 1987) et le modèle de l'utilité attendue (Shanteau & Pingenot, 2009). Ces modèles distinguent ces caractéristiques des risques dans l'étude de la perception des risques. Par conséquent, l'étude exploratoire était utile pour s'assurer que les variables de l'étude pouvaient être obtenues parmi la population de personnel hospitalier dans les hôpitaux nigériens. Un aperçu des résultats de l'hypothèse principale issus des analyses quantitatives sera discuté dans les paragraphes suivants.

Les croyances fatalistic en tant que facteurs du comportement de sécurité, de l'efficacité perçue des actions préventives et des explications causales des accidents.

Notre étude révèle que le personnel hospitalier qui ont des croyances fatalistes élevées adoptent un comportement moins sûr face aux risques sur le lieu de travail. Ceci est enregistré dans plusieurs études sur le fatalisme et le comportement de sécurité (McIlroy et al., 2020 ; Patwary et al., 2012). En effet, le sentiment de manque de contrôle et d'impuissance face aux situations d'accident affaiblit l'engagement des individus à prendre des précautions au travail. De plus, les personnes qui sont accablées par la pensée que les accidents sont prédéterminés et inévitables, pensent que les mesures prises pour prévenir les accidents et les maladies au travail ne sont pas efficaces. Cela signifie que les individus fatalistes peuvent avoir l'idée que les mesures de sécurité ne permettent pas d'éviter les accidents, car les accidents qui sont inévitables se produiront quelles que

soient les mesures prises pour les prévenir. Notre conclusion sur l'influence négative du fatalisme sur la perception des actions de prévention est intéressante et constitue un ajout important à la littérature scientifique sur le rôle des croyances fatalistes sur l'efficacité perçue de la sécurité au travail. Fondamentalement, cette découverte originale a clairement établi que les croyances fatalistes prédisent négativement la perception des actions prévention chez les membres du personnel hospitalier nigériens.

Certes, on s'attend à ce que les individus fatalistes fournissent des facteurs externes et incontrôlables pour expliquer l'accident (Peltzer & Renner, 2003). Contrairement à cette hypothèse, nous avons observé, dans le cas des membres du personnel hospitalier nigériens, un résultat inhabituel : les croyances fatalistes des travailleurs sanitaires prédisent négativement leurs explications causales externes. Les croyances fatalistes des membres du personnel hospitalier ne les conduisent pas à compromettre leur explication objective des causes des accidents par des facteurs internes. Nous avons suggéré de prendre en compte les attributs personnels confondants dans le lien entre les croyances fatalistes et les explications causales de l'accident. Par exemple, nous avons constaté que le fatalisme est surtout associé aux personnes qui n'ont pas d'expérience en matière d'accidents, aux personnes ayant un niveau d'études inférieur et aux jeunes. Ces variables peuvent affecter indirectement la relation entre le fatalisme et l'explication causale. Il est donc nécessaire d'approfondir ces variables et leur lien avec les croyances fatalistes.

Explications causales de l'accident : prédicteurs du comportement de sécurité et de la perception des actions préventives

Des recherches antérieures ont démontré que le fait de donner des facteurs personnels dans l'explication de l'accident encourage l'implication dans le comportement de sécurité (Boua, 2021 ; Ngueutsa, 2013 ; Rusch et al., 2003). Ce résultat bien que non confirmé dans notre étude, la direction de notre résultat montre que le personnel hospitalier qui reconnaissent plus de facteurs internes dans l'explication de l'accident hospitalier ont tendance à respecter les règles de sécurité. En effet, l'explication causale est un outil utile dans l'analyse des accidents et l'évaluation du comportement individuel face aux risques. En outre, lorsque le personnel hospitalier explique l'accident par des facteurs externes, ils ont tendance à moins percevoir l'efficacité des actions préventives. Cela va à l'encontre de l'étude de Mbaye et Kouabenan (2013), selon laquelle le fait de percevoir l'analyse fondée sur l'expérience comme efficace peut inciter les gens à expliquer l'accident par des facteurs internes. Par conséquent, lorsque les causes des accidents sont attribuées à des facteurs externes incontrôlables, les actions préventives seront probablement perçues comme peu efficaces.

De plus, l'efficacité perçue des actions préventives tend à inciter les individus à appliquer des mesures de sécurité. En effet, nos résultats montrent qu'une évaluation positive des actions préventives peut encourager le personnel hospitalier à prendre des mesures de sécurité en vue de prévenir les risques et les accidents. Une relation positive entre l'efficacité perçue et le comportement de sécurité a été établie dans l'étude de Bechard et al. (2021). Ils ont établi que les personnes qui perçoivent l'efficacité des mesures préventives contre le COVID 19, sont plus susceptibles d'adopter un

comportement de sécurité que celles qui ont une faible perception de l'efficacité des actions prévention.

La perception des risques au travail élevée renforce l'implication dans les mesures de sécurité et les explications causales internes de l'accident.

Des études ont établi que la perception des risques est un déterminant influent du comportement de sécurité (Boua, 2021 ; Neuburger & Egger, 2021 ; Simsekoglu et al., 2013). Plus précisément, nous avons constaté que la perception de la gravité du risque hospitalier avait un effet positif important sur le comportement des membres du personnel hospitalier. Ce résultat est en accord avec ceux de Carico et al. (2020) et Kayani et al. (2021) qui ont trouvé que la perception de la gravité du risque influence positivement le comportement de sécurité. Parmi les trois caractéristiques du risque étudiées (probabilité, gravité et contrôlabilité), le comportement du personnel hospitalier n'a été influencé positivement que par leur perception de la gravité des risques hospitaliers. Ce résultat est utile pour comprendre l'aspect de la perception du risque qui affecte principalement le comportement du personnel hospitalier. Par conséquent, se concentrer sur la caractéristique du risque peut aider à définir clairement l'aspect de la perception du risque qui peut améliorer le comportement sûr.

Une analyse plus approfondie révèle que la perception du risque influence les explications causales de l'accident (Palat & Delhomme, 2018 ; Rickard, 2014). Nous rappelons que la perception du risque et l'explication naïve de l'accident sont deux constructions psychologiques complémentaires (Kouabenan, 2009) qui aident à la compréhension des comportements de sécurité. Notre étude nous apprend que la

perception de la probabilité du risque, de sa gravité et de sa contrôlabilité conduit du personnel hospitalier à expliquer l'accident par des facteurs personnels.

Conclusion et implications pratiques

Cette thèse a étudié de manière systématique les déterminants subjectifs du comportement des membres du personnel hospitalier nigériens face aux risques et aux accidents du travail en milieu hospitalier. Les résultats révèlent que le comportement des membres du personnel hospitalier peut être expliqué en prenant en considération leurs croyances (fatalistes, contrôle et normatif), l'explication naïve de l'accident, la perception du risque et la perception des actions prévention. Par conséquent, le résultat impressionnant de cette thèse met en évidence des facteurs cruciaux qui peuvent être reconnus dans l'analyse et la gestion des accidents pour améliorer la sécurité des travailleurs. Sur le plan théorique, la plupart des résultats de cette thèse confirment les recherches antérieures sur ce sujet. De même, des résultats innovants ont été enregistrés, ce qui contribue à la connaissance théorique dans ce domaine de recherche. Ces résultats ont satisfait l'objectif de cette étude avec des implications pratiques réalisables qui peuvent être avantageuses dans la prévention et la gestion des accidents.

Nous avons observé distinctement que le fatalisme est un facteur puissant qui conduit à compromettre les pratiques de sécurité et à percevoir moins l'efficacité des actions prévention. Cela indique que la construction d'un état d'esprit positif plus fort de personnel hospitalier nigériens sur la contrôlabilité du risque professionnel, visant à réduire leurs croyances fatalistes, ne peut être compromise ou surestimée. Pour que la direction de l'hôpital réussisse à intégrer le processus de réduction du fatalisme chez les travailleurs de santé, il est nécessaire de mettre à jour le programme de sécurité dispensé dans les formations et les ateliers des travailleurs avec des faits et des messages qui

provoqueront la prise de conscience que les accidents peuvent être contrôlés. En outre, il est impératif d'organiser des programmes périodiques de communication sur la santé pour faire prendre conscience de cette forme de croyance qui peut compromettre le comportement de sécurité. Cela permettra d'améliorer les connaissances des travailleurs sur le fait que les facteurs personnels peuvent contribuer aux accidents, tandis que la sensibilisation à la sécurité peut réduire les occurrences d'accidents et augmenter la sécurité au travail. Ceci peut être soutenu par le fait que l'explication des accidents par des facteurs internes améliore l'implication dans les protocoles de sécurité. Cela suggère l'importance pour les travailleurs de reconnaître les facteurs internes dans l'explication des accidents du travail.

En outre, nos résultats révèlent que l'amélioration de la gravité perçue du risque associé au travail hospitalier est utile pour renforcer les pratiques de sécurité chez le personnel hospitalier. Comparativement aux autres caractéristiques du risque, la gravité perçue du risque est très distincte dans son effet positif sur le comportement de sécurité. En conséquence, nous suggérons l'utilisation de la technologie et des médias pour faciliter la diffusion d'informations aux personnel hospitalier sur la gravité des risques associés à leur travail, ce qui peut améliorer leur engagement à long terme en matière de sécurité. Par exemple, la direction de l'hôpital peut utiliser les médias sociaux tels que les courriels, WhatsApp, etc. pour faire passer des messages à tous les travailleurs de santé. De plus, compte tenu du lien entre les croyances et la perception du risque, les activités visant à renforcer la perception de la gravité du risque chez le personnel hospitalier peuvent inversement réduire leur jugement fataliste du risque et de l'accident de travail. Puisque le fatalisme est plus élevé chez le personnel hospitalier les plus jeunes et ceux qui n'ont pas un niveau d'étude élevé, il est vital de donner la priorité à ce groupe de personnes et

de s'assurer qu'il est bien représenté dans les programmes de communication sur la santé qui sont conçus pour décourager les croyances fatalistes chez les travailleurs de la santé du personnel hospitalier.

De plus, nous avons observé que lorsque les membres du personnel hospitalier perçoivent l'efficacité des mesures préventives, ils sont susceptibles d'adopter un comportement sécuritaire. Cela signifie qu'il ne suffit pas d'avoir des règles. Il faut vérifier qu'elles sont compréhensibles, que leur application est possible et ne demande pas trop d'efforts de la part des travailleurs qui pourraient être tentés de les contourner. De plus, l'acceptation des règles par les membres du personnel hospitalier est fondamentale car leur adhésion dépend de leur perception de l'efficacité de ces règles pour prévenir les risques qu'ils perçoivent et de leurs explications des accidents dans leur environnement de travail. Nous pouvons en déduire au contraire que lorsque les membres du personnel hospitalier perçoivent les actions de prévention comme inefficaces, cela peut les conduire à trouver des alternatives basées sur leurs initiatives personnelles, ce qui peut être contraire aux bonnes pratiques médicales. Par conséquent, l'examen de la perception des travailleurs sur l'efficacité des mesures préventives mises en place ou sur celles qui font défaut peut servir de retour d'information sur ce que la direction de l'hôpital doit améliorer ou maintenir. En plus, la mise à disposition d'infrastructures et d'équipements de sécurité peut compléter l'efficacité perçue par les travailleurs, ce qui peut stimuler leur implication dans les actions de prévention.

De plus, nous avons constaté que la perception du risque est positivement liée à la perception des mesures de prévention. En effet, lorsque le personnel hospitalier perçoit que le risque hospitalier est contrôlable, ils sont convaincus que les actions de prévention sont efficaces pour la prévention des accidents. En complément des résultats existants sur

la perception du risque, la perception de la probabilité et de la gravité du risque ne conduit pas le personnel hospitalier à croire que les actions préventives ne fonctionnent pas. Au contraire, ils comprennent la gravité de l'effet du risque sur l'agent de santé s'il est rencontré. Ce facteur peut être expliqué par le niveau d'éducation des agents de santé. Nous avons constaté que plus ils acquièrent une éducation élevée, plus ils perçoivent la gravité et la probabilité du risque. Cela indique l'importance d'étudier la perception du risque en fonction de ses différentes caractéristiques plutôt que comme un concept global. Cela permet de mieux comprendre comment les différents attributs du risque interagissent avec d'autres concepts pour influencer le comportement. Ces résultats sont utiles pour comprendre que le mécanisme de la réponse du personnel hospitalier aux risques sur le lieu de travail.

En général, la direction des hôpitaux devrait prendre en considération les croyances le personnel hospitalier, leurs explications causales de l'accident et leur perception du risque pour comprendre leur comportement au travail et élaborer de meilleures stratégies de prévention. Ainsi, lors de la conception des programmes de prévention, il convient de prendre connaissance des mesures visant à éliminer les causes internes et externes des accidents du travail dans les hôpitaux. La responsabilité incombe à la direction de voir avec du personnel hospitalier, leurs perceptions du risque et leurs explications causales de l'accident pour une politique de prévention efficace et réalisable.