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Workers' Perceptions of Occupational Safety and Health in a Textile Industry in the Democratic Republic of Congo

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Abstract

Background: There is a lack of studies on workplace safety in Africa and in particular as a Democratic Republic of Congo (DRC). The present study was designed to explore perceptions of the workers of the textile in DRC. The aim was to analyze how different risk perceptions can influence the behavior of security and health related to work. ***Methods:*** A cross-sectional study was conducted on a representative sample of textile Workers Company in DRC. Data collection (N= 228 subjects) was performed using a self-administered questionnaire. The survey questionnaire was developed using validated questionnaire for the assessment of work safety scale, the model of work organization and safety and performance behavior, supplemented by the European working conditions surveys. The internal consistency coefficients (Alpha de Cronbach) for reliability analysis were calculated separately for each measurement. Only scales with reliable internal consistency (Cronbach alpha index >= to 70) were selected in our analyses. The relationship between perceptions and work-related accident was analyzed by an ANOVA-one-way analysis for independent samples. For each scale, a correlation of Spearman was calculated. A logistic regression model was used to assess the association between the accident and the predisposing factors for the different scales of the questionnaire. ***Results:*** The correlations in this study are highly significant for different scales. The strongest correlations are between the perceptions of the Management Safety Practice and Supervisor Safety. The results showed a difference in the frequency of accidents according to workers' safety perceptions. Workers who were not victims of an accident presented higher mean scores for Job safety, Management safety practice, Safety knowledge and SCRD. The study shows that the accident rate is significantly related to Job safety (OR= 2,1), to Management safety practice (OR=2,9). Safety knowledge (OR=0, 37) and the SCRD (OR=0, 30) have protective effect. ***Conclusion:*** The present study shows that the perception of workers influences their health-safety behaviours at work. It's highlighted the influence of occupational safety knowledge, the management system on the occurrence of the work accident. The results provide valuable guidance for policy makers, researchers and practitioners to identify mechanisms to improve workplace health and safety.

Key words: Perception, worker, safety, occupational health, textile, drc.

INTRODUCTION

Professional risk management is now a matter of great concern in all societies around the world, particularly in industrialised societies [1-3]. Despite the success of the technical and organisational preventive measures, there are still a significant number of unintentional situations in which the individual behaviour of operators based on their perceptions would play an important part in the history of the accident [2, 4]. Risk perception is a process by which individual organizes and interprets his sensory impressions in a way that makes sense of his environment, a process through which sensations are organized into an inner representation of the world [4-7]. The first work on risk perception was initiated in the 1970s by American psychologists [1, 7]. Risk perception have a role at all levels of risk management, ranging from strategic business management choices to worker readiness to prevention messages and their adherence to proposed action strategies [8, 9]. Risk perception is influenced by factors such as the organisational climate and the safety climate within the company [10-13]. This analysis of workers' perceptions will focus on the following dimensions:

- The organisational climate which refers to shared perceptions of the organisation, the system of values, standards, beliefs, practices and procedures [13-16].
- The safety climate, defined as a coherent set of perceptions and expectations that workers have regarding their organisation's safety [10, 12, 13, 17]. The safety climate is a specific component of the organizational climate, which describes employees' shared perceptions of how security management is operationalized in the workplace. These perceptions provide an indication of the priority given to safety in relation to other requirements such as production or quality [10, 12, 17] .
- Safety behaviour is structured around the issue of compliance with the defined safety rules [10, 12, 16, 18]. This concept distinguishes between two types of rule violations. Routine violations are mentioned when the most common ways of working differ from the rules and procedures laid down, with workers using "shortcuts" to minimize the effort to be made. However, situational violations are considered essential to do the job and occur when workplace circumstances (such as time pressure, availability of equipment) require or encourage employees to violate specific rules [16, 19-21].
- Safety knowledge is a direct determinant of performance behaviour. Knowing how to safely handle dangerous chemicals, for example, is a prerequisite for safe behaviour [16, 22, 23].
- Safety citizenship and role definition (SCRD) or citizenship in relation to safety is a concept that corresponds to the worker's personal commitment to improving safety at work [20, 24-26].

In order to better control risk, considering the individual's perceptions of risk is therefore an essential element of the prevention approach. Several studies suggest that work-based health promotion programs that have been established to be effective have taken into account environmental factors (perceptions, representations, attitudes and beliefs) that influence the behaviour of operators [8, 27-33].

It should be noted that the majority of the studies mentioned above have been carried out in developed countries and that there is a lack of studies on workplace safety in sub-Saharan Africa, particularly in the DRC. This exploratory study was therefore designed to explore the perceptions of African workers in relation to occupational risks such as work-related accident in an industrial enterprise in the DRC.

The aim was to analyse how individual risk perceptions influence safety behaviour in the African environment, particulary in DRC, with a difficult socio-economic context and a particularly different working environment.

MATERIALS AND METHODS

Study context

The study was carried out in a textile industry located in Kisangani, North-East DRC. This industry produces different fabrics from cotton fibre. At the time of the investigation, the industry had approximately 800 employees for the various departures within it: production department (spinning, weaving, finishing), the logistic department and the administrative department.

Study population and sampling technique

This cross-sectional study was conducted on a representative sample of workers in society. The Epi-info software calculated the sample size needed, by accepting a precision of 5% with a 95% confidence level and a 50% prevalence of health problems, the sample size was 258 workers, to be recruited by systematic random sampling. This is a systematic sampling based on the list of all the staff available to the human resources department. This list is based on the employee serial numbers. The random sample was calculated in accordance with the calculation of a sampling interval with the selection of a random number. Thus, 258 subjects in the different directions were selected. The inclusion criteria included a length of service of at least one year and voluntary acceptance. Selected individuals were informed about the survey, its anonymity and data privacy.

Survey procedures

Data collection was perfomed using a self-administered questionnaire. Investigators (N = 10) were selected among undergraduate students in Public Health degree, Faculty of Medicine, University of Kisangani. They followed a seven-day training, during which they were informed on the objective of the study and the survey organisation. Before starting survey, a pre-test focusing on the procedure to be followed was carried out among workers not selected for the study. The investigation took place from 01 July to 30 August 2020.

The questionnaire was anonymous, and confidentiality was guaranteed. The questionnaire was completed independently by each worker, after a brief explanation by the research team in a meeting room of the company provided for that purpose. Investigator was present when the questionnaire was filled and, if necessary, answered the questions of the workers.

The survey questionnaire was developed on the basis of the survey used in Belgium for the national health survey [34], the medical surveillance surveys for occupational risks (SUMER) in France [35], the European surveys on working conditions [36], the model of work safety scale [37] and the model of work

organisation [14, 16] and safety and performance behavior [12, 14, 38].

The questionnaire includes a total of 138 questions: questions relating to socio-demographic characteristics (n=7), to work and working conditions (n=39), to the worker health (n=23), to the organisation of work and to the behaviour of the worker (n=19), and to a French version of the work safety scale (n=50). In this study, work health and working conditions issues have not been exploited.

Survey tools

The variables studied include:

- Accidentality

The frequency of accidents in the past year was self-assessed by the participants and categorized into three classes: Not Yes, once Yes, more than once.

- The socio-demographic variables: age, sex, work area, status at work, number of hours of work, night work and experience (length of service)
- The organisational climate: The items related to the organisation of work [16] include 5 items: - a heavy workload; - Are roles/tasks well defined - the possibility of organising your work alone (autonomy); - support received from your leader and/or colleagues; - satisfaction with pay.
- The safety climate: this safety climate was evaluated with the Work Safety Scale (WSS, 50-item) developed by Hayes *et al.* [37].This instrument explores five distinct elements: (a) the safe nature of the job (n=10 items), (b) the safety attitudes and behaviours of colleagues (n=10), (c) those of the supervisor (n=10), (d) the management's concrete commitment to safety (n=10), and (e) satisfaction with the security programs in place (n=10).
- Safety behaviour: Items of this dimension [12, 14, 38] include two categories: - routine violations (4 items) and situational violations (6 items).
- The other items in the questionnaire include the following: Safety knowledge (4 items); Safety motivation (3 items); Safety Participation (4 items); Safety citizenship and role definition (SCRD) (4 items) [12, 38, 39].

For all the dimensions explored, the participants responded on a Likert scale ranging from 1 (not at all agree) to 4 (fully agreed). For SCRD, however, the response scale had 4 different modalities (1-is part of my work; 2-Exceeds my job 3-far exceeds my work; 4-entirely beyond my work).;

Data handling

The study compared workers' safety perceptions according to whether they reported having suffered in the last 12 months zero accidents or at least one accident. The response categories "one accident" and "more than one accident" were therefore grouped together. Data were encoded in Excel™ and Statistical analyses were performed with SPSS software version 22.

Before performing the various analyses, the internal consistency coefficients (Alpha de Cronbach) for reliability analysis were calculated separately for each measurement. Only scales with reliable internal consistency (Cronbach alpha index >= to 70) were selected in our analyses.

For all scale, the score was calculated by summing the responses to the various items. For SCRD, the responses to the items were reversed: a high score thus indicates a high commitment to safety.

The relationship between perceptions and whether or not they were the victim of (work related accident) an accident at work (independent variable or factor) was first analysed by an ANOVA-one-way analysis for independent samples. For each scale, a correlation of Spearman was calculated.

In order to assess the association between the accident (worker accident victim = dependent variable) and the predisposing factors for the different scales of the questionnaire (considered as independent variables), a logistic regression model was used, with a top-down procedure and likelihood ratio. The category with the least accidental risk was taken for reference. Only significant scales were included in the logistics regression model. For all analyses, the chosen significance thresholds were 0.05; 0.01; 0.001.

RESULTS

Description of the sample

About 258 workers, 247 agreed to participate in the survey, but the effective respondents (survey day) were only 228, or 92% of the sample selected. Participants are 46.5 years of age (8.6), they are mostly male (82.9%) and having worker status (67%). Most workers have a permanent contract (74.5%) and an experience over 10 years (59%), but most have not training within the company (61%). Two-thirds of the sample (67%) reported having suffered at least one work accident in the last 12 months.

Scale validity and reliability

The following scale showed satisfactory reliability. Cronbach's alpha scores were 0.71 for Job Safety; 0.77 for Supervisor Safety attitudes and behaviours; 0.72 for Management Safety practice; 0.73 for Safety knowledge; and 0.73 for Safety citizenship and role definition (SCRD).

Table-1: Descriptive statistics (m ± SD) and correlations between measurement scales.

	Mean	Standard Déviation	Job Safety	Supervisor Safety	Management Safety practices	Safety Knowledge	Safety Citizenship Role Definition
Job Safety	25,93	3,99	1				
Supervisor Safety	29,06	4,59	0,74**	1			
Management Safety Practice	28,26	4,12	0,75**	0,78**	1		
Safety Knowledge	11,8	2,03	0,63**	0,51**	0,58**	1	
Safety Citizenship Role Definition	11,53	2,41	0,77**	0,64**	0,71**	0,65**	1

** : corrélation significative au niveau 0,01

As the table shows, the average scores of the different scales were all very significantly correlated with each other. The strongest correlations are observed between the perceptions of Management Safety Practice and Supervisor Safety and between the perceptions of Job Safety and the Safety Citizenship Role Definition. There is therefore a strong association between what workers perceive in terms of their direct leader's safety attitudes and behaviour and what they perceive in terms of the management's concrete commitment in this regard.

Furthermore, the character of the job held is deemed dangerous, the more the worker's personal commitment to a safety improvement is important. Lower correlations exist between Supervisor Safety, Management Safety Practice and Safety Knowledge. Self-evaluation by the workers of their safety knowledge is weakly linked to what they perceive the behavior of supervisors and management commitment in this regard.

Table-2: Associations between worker accidents and different levels of perception of safety

VARIABLES		NO Accident		Accident		
	M(SD)	N	M(SD)	N	M(SD)	P
1. Job Safety	25,93(3,99)	76	28,36(2,52)	152	24,72(4,04)	< 0,001
2. Supervisor Safety	29,06(4,59)	76	31,14(3,29)	152	28,01(4,81)	< 0,001
3. Management Safety Practice	28,23(4,86)	76	30,26(2,79)	152	27,26(4,32)	< 0,001
4. Safety Knowledge	11,80(2,03)	76	13,68(1,27)	152	10,86(1,65)	< 0,001
5. Safety Citizenship Role Definition	11,53(2,41)	76	13,58(1,61)	152	10,51(2,07)	< 0,001

*M= Mean; SD= Standar Deviation ; *N=Number ; *P= P-value

It appears in this table that workers who have suffered at least one work related accident have shown very significant differences in perceived safety relative to their colleagues without work accident in the various components of the Work Safety Scale: Job safety, Supervisor Safety and Management Safety Practice; the same applies to the perceptions of Safety knowledge and the Safety Citizenship Role Definition (SCRD). The occurrence of the work-related accident appears to be associated with the way workers perceive the attitudes of their supervisors as well as safety management practices. Those who have not experienced a work-related accident consider their work more dangerous and have a more positive perception of their supervisor's attitudes and behaviours and the management's commitment to safety. Workers who have been victims of one or more accidents assess on average their safety knowledge as lower and also feel less their personal commitment to safety. The significance threshold is at P<0.001.

Table-3: Multivariate analysis: Logistic regression: Associations between the work-related accident and the different scales of perceived safety

Variables	OR	CI	P
Job safety	1,69	(1,02 - 1,71)	0,04
Management Safety Practice	1,98	(1,27 - 2,78)	0,002
Safety Knowledge	0,37	(0,18 - 0,76)	0,007
Safety Citizenship Role Définition	0, 30	(0,15 - 0,60)	0,001

*OR = odd ratio ; CI= confident interval

Table 3 presents the associations between the work-related accident and the different scales of perceived safety.

This table shows that the frequency of work accidents is significantly associated with the perceptions of Job Safety and the Management Safety Practice.

The perceptions of occupational hazard and management's commitment to safety are associated 1.7 times and 1.98 times respectively with the risk of occurrence of work-related accident. However, a lower frequency of workplace accidents is significantly associated with the concepts of Safety Knowledge and Safety Citizenship Role Definition. Thus, the perception of safety knowledge and his own commitment seem to have a protective role in the work-related accidents.

DISCUSSION

The main objective of this study was to explore workers' perceptions of occupational health and safety risks in a textile company in the DRC.

This study showed that correlations are highly significant for different scales. The strongest correlations are between the perceptions of the Management Safety Practice and Supervisor Safety, and the weakest between perceptions of safety knowledge and the attitudes and behaviours of supervisors. The results showed a difference in the frequency of accidents according to workers' safety perceptions. Workers who have not been involved in an accident had a significantly positive and constructive perception of safety in the workplace. Our observation highlighted a significant association between the reported accident rate, safety perceptions, the role of supervisors and management practices. It appears from our study that workers with high accident frequencies (at least one accident) expressed the existence of poorest or most absent safety practices. Workers who were not victims of an accident presented higher mean scores for Job safety, Management safety practice, Safety knowledge and SCRD.These observations are corroborated by several other studies in this area [8, 10, 11, 40]. They also join those of Gyekye *et al.* [41-43] in studies conducted in Ghana. Several safety studies and research argue that poor management or mismanagement in workplace safety policies is the leading cause of non-compliance with safety rules, which contributes to the occurrence of work-related accidents [13, 20, 22, 44]. Organizations whose management commitment for safety is clearly demonstrated tended to motivate their workers for positive behavior and to successfully reduce the frequency of accidents [23, 39, 45-47].The multivariate analysis shows that the accident rate is significantly related to safety Job (OR = 1.69), to Management safety practice (OR = 2). An inverse association is observed with Safety knowledge (OR = 0.37) and the SCRD (OR = 0.30). It is therefore noted that perceptions of occupational hazard and of deficiencies in management practices and commitment increase the likelihood of workplace accidents. Thus, good are safety knowledge, the better is personal commitment to safety in its own role, the less work-related accidents have happened. These results are supported by studies done elsewhere that argue that the actions of the hierarchy would be vital on perceptions of safety matters and for the health consequences [31, 39, 41, 48, 49]. It also appears from several studies that the availability of a generally positive and supportive managerial system could influence the level safety knowledge (= safety knowledge) with which workers perceive safety as an important factor in their organizations[29, 45-47, 50].These measures, in addition to reducing the high human and social costs caused by workplace accidents, promote efficiency and productivity. Several studies have argued that worker participation in decision-making is very important in the implementation of safety and health prevention measures in the workplace as well as in the compliance of workers [9, 29, 33, 39, 42, 51, 52].

Despite the DRC's difficult socio-economic context and a different working conditons environment, the observations made in the present study show that workers' perceptions influence safety behaviour almost exactly the same as that described in other studies in both Africa than in industrialized countries. Unilateral orders from the hierarchy, favored by the top-down culture, might partly explain this similarity. The interaction of subordinates and superiors is often hampered by cultural norms, which often limit open and sincere discussions of workplace safety issues [32, 40, 43, 48, 53].

In order to solve this situation, subordinate workers should be encouraged to actively participate and contribute to the safety-related discussions. They would be motivated to actively engage in activities considered as a facilitator of success to organizational objectives such as compliance and adoption of safety management policies [12, 16, 39, 54].

For this reason, the perception of risk by workers must be considered when implementing strategies for different working environments [23, 29, 30, 33, 39, 42, 47, 49, 52].

The results of this study are important because they attempt to highlight the influence of management practices, safety knowledge and their various implications on workers' perceptions of workplace safety.

Prevention strategies are required to consider the perceptions of workers and own socio-cultural aspects to African countries [48, 54, 55].

BIAS AND LIMITS

A quantitative study using a self-administered questionnaire was conducted using validated measurement scales, including the WSS, already used in other studies carried out in Africa [31, 32]. It is evident that the technique of multiple-choice questions offers less wealth and can make difficult the interpretation of certain response trends. Thus, the exploitation of certain scales was not possible in this study because of their low psychometric qualities. This observation could perhaps be explained by the workers' insufficient understanding of certain questions in the questionnaire. Another limitation of this work is the fact that the study has only been carried out by the executors, which effectively reduces the quality of the overall diagnosis and the remedial proposals that can be advanced.

As the study focused on only one company, it is not possible to extrapolate the results to all textile workers in the country. The « healthy worker effect » may also be seen as a bias, as the sick-listed individuals at the study period had no access to the survey. A final potential limit concerns the accidentality variable, insofar as the frequency of occupational accidents is self-declared, with the possibility of error and memorization (recall) bias.

CONCLUSION

This study is the first conducted in this field in DRC. Despite the limitations mentioned above, this study shows that the perception of workers influences their health-safety behaviours at work. This study highlighted the influence of occupational safety, the management system on the occurrence of the work accident in the DRC. Thus, these results provide valuable guidance for policy makers, researchers and practitioners to identify mechanisms by which they can improve workplace health and safety.

In the future, the qualitative study and the inclusion of all workers as well as supervisors and / or managers in future studies should contribute to enriching the occupational health and safety results obtained in the context of this work in developping country.

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All authors have participated effectively in the preparation and the writing of the manuscript. They read and approved the final version of this.

COMPETING INTERESTS

The authors declare that they have no competing interests.

ETHICAL CONSIDERATIONS

All participants in this study were informed of the objective pursued and the methodology used to collect their information. A verbal consent was obtained, and guarantees were given that the data collected will be analyzed anonymously.

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