

## Original Papers

# Occupational Stress among Textile Workers in the Democratic Republic of Congo

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**Abstract:** Context: In the Democratic Republic of Congo (DRC), scientific studies on occupational health are scarce. The present study aims at estimating the level of occupational stress, as well as associated factors, in a textile company.

Methods: We performed a cross-sectional survey among textile workers in DRC. Data (N = 192 subjects) were collected through a self-questionnaire validated for the assessment of stress (Karasek and Siegrist's scale); supplemented by a medical examination. Frequencies and odds ratios (ORs) were estimated for descriptive analyses. Adjusted ORs were calculated through a logistic regression model to investigate associations between socio-demographic and organisational variables and stress.

Results: Our study highlighted a high level of stress among individuals: 28% of them were suffering from stress, according to Karasek, and 22%, when applying Siegrist's model. A 14%-isostrain was calculated when considering all workers. A statistically significant association was observed between stress and age, seniority and perceived non-adaptation to work, considering both approaches. Furthermore, when job strain was determined according to Karasek, it was related to the worker status, the poor perception of organisation and alcohol consumption, while stress estimated by applying Siegrist's model showed an association with education level and the occurrence of cardiac symptoms.

Conclusion: The present study provides of stress among individuals through both models. Several socio-professional factors are associated with stress, which determines populations at risk. The results revealed that both stress models offer complementary information, thus increasing the probability to model workers' health more exactly and to make recommendations on prevention and management.

**Key words:** stress, cotton, industry, occupational health, drc

## INTRODUCTION

Work has a major influence on the health and well-being of individuals. In order to boost their competitiveness, companies often set target of productivity and innovation, which exert increased pressure on workers and can lead to stress-related health problems [1, 2]. Occupational stress is generally considered to be the consequence of a negative imbalance between job demands and job resources experienced by the worker [2, 3]. Considered a public health issue due to the effects on workers' health, work-related stress can be seen as an illness that has arisen in modern societies [1, 2]. Besides health consequences

and compensatory behaviours (e.g. alcoholism, smoking or eating disorders, etc.) [4–6], occupational stress may have a negative effect on companies, such as increased absenteeism and employee turnover, decreased productivity and rising health care costs [7, 8].

Studies on occupational stress are numerous and have focused on almost all sectors of human activity and all socio-professional categories [9]. Prevalence has been well assessed in industrialized countries. In Europe, it was estimated, on average, to be 22% in 2005 and 21% in 2010; of course, these estimations varied from one country to another [9]. In developing countries, scientific research on this topic is scarce despite the abundant manpower (numerous

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companies from industrialised countries have been relocated in Africa). The lack of reliable and accurate data suitable for stakeholders to implement a prevention policy in workplaces is evident [10]. The Democratic Republic of Congo (DRC) is no exception. As in any developing country, DRC workers often face multiple constraints (precarious working conditions, poor work organisation and earnings, etc.) in the fight against unemployment. All these constraints can lead to work-related stress and jeopardize the mental and physical health of individuals.

The present study was conducted to assess the prevalence of occupational stress and identify potentially associated factors, as well as their frequency, among the staff of a textile company based in DRC.

The assessment of work-related stress was performed through scientifically validated tools: the Karasek's Job Content Questionnaire (JCQ) and the Siegrist's scale [11, 12]. By combining both models, the authors attempted to provide a wider overview of the multiple factors potentially affecting health in the work environment. Many studies highlighted the predictive validity of Karasek's model and Siegrist's scale for cardiovascular disease [13] and mental illness [14–16]; they were also useful for assessing psycho-social constraints in the work environment and global health indicators such as perceived health, quality of life or absenteeism due to medical reasons [17–19]. The major advantage of such models is their relative simplicity; furthermore, they have been empirically studied in numerous epidemiological and psychophysiological studies performed in different countries within the framework of investigations aiming at exploring the influence of working conditions. These models are widely used and were validated internationally through studies carried out in both industrialised and developing countries [11, 12, 20–22].

To our knowledge, this is the first time for the above approach to be performed in DRC in that sector. It should help to design and adapt prevention strategies and support systems to improve mental health at work.

## METHODS

### Study context

This cross-sectional study was performed in 2013 in a textile company based in the eastern province of the DRC. At the time of the study, the company was employing 877 agents (202 employees and 675 workers).

### Study population

The study target population consisted of all people working in the factory, except those assigned to technical services. Sampled populations included workers and em-

ployees assigned to production (spinning and weaving) as well as administrative staff. Any full-time worker/employee, having at least one year of service and willing to participate, was eligible for the study.

Epi Info software™ allowed us to estimate the sample size required, through the “population survey” function, and to consider a whole population size estimated at 900, a 50%-expected prevalence (frequency or proportion), a 4–5%-worst acceptable result (margin of error on the proportion) and 95%-confidence limit. In order to compensate for non-responses and recording errors, an additional 5% was considered as well. The final sample was thus made up of 384 persons. A stratification with equal allocation was applied (i.e., similar numbers were selected for each category of occupational status). Nevertheless, the sample size was further reduced by half to adjust to logistical challenges linked to the distribution of questionnaires. Based on the staff list, and considering inclusion criteria, a total of 192 individuals (96 workers and 96 employees) selected by simple random sampling participated in the study.

### Survey procedures

Investigators (N = 8) were selected from among undergraduate students in the Public Health Department, Faculty of Medicine, University of Kisangani. They underwent a five-day training program, during which they were informed on the objective of the study and the survey organisation. Before starting the survey, a pre-test focusing on the procedure to be followed was carried out among workers not selected for the study.

The 192 selected individuals were informed about the survey, its objectives and data privacy. Questionnaires were completed, in small groups, while on duty, in a meeting room of the company provided for that purpose. After measuring their vitals (blood pressure [BP] and heart rate [HR]), the questionnaire was distributed to the participants. A brief explanation on how to answer was provided by the investigators upon starting each session. Throughout the session, which lasted between 30 and 50 minutes, investigators supervised the group and answered questions. Blood pressure and HR were also measured after completing the questionnaire. The 192 questionnaires took eight days to complete: three days for workers and three days for employees, while the last two days were provided for late-comers.

### Survey tools

The survey consisted in the management of a self-questionnaire and the measurement of several medical parameters in relation to somatic signs of stress.

The self-questionnaire included socio-professional in-

formation, the validated French version of Karasek's questionnaire [11, 23], as well as Siegrist's questionnaire [12]. Socio-professional data concerned: worker status (worker/employee), age ( $\leq 39$  years old/40 years old and above), gender (male/female), seniority (1–9 years/10 years and above), marital status (single/married), alcohol consumption (yes/no) and tobacco consumption (yes/no). Two questions regarding the worker's own opinion on work organisation and his/her personal adaptation to work (good/poor) were also part of the questionnaire.

Karasek's questionnaire incorporates three dimensions: Decision Latitude (DL) or control (9 questions; score 9 to 36), Job Demands (JD) (9 questions; score 9 to 36), as well as Social Support (SS) (8 questions; score 8 to 32). For each respondent, scores for the three dimensions were differentiated into two classes: low score (L) – any score below the median score of the whole sample for the corresponding dimension – and high score (H) – any score above the median score. According to the selected methodology [11, 23], staff members were divided into 4 categories: « job strain » or Tense (high job demand [HJD] and low decision latitude [LLD]), Active (HJD and HDL), Relaxed (LJD and HDL) and Passive (LJD and LDL). Job strain corresponds to the combination of a high demand and low latitude, as opposed to all other situations. The model also includes the « isostrain » category, combining a high demand, a low latitude and a low support, compared to other situations [11, 24–27].

Siegrist's scale (effort/reward) considers the following dimensions : Extrinsic effort (6 items, score from 6 to 12), Intrinsic effort ([over-commitment], 6 items, score from 6 to 12) and Reward ([estimation : 5 questions, score from 5 to 10], Money bonus : 1 question [score 1 or 2]) and Control on the professional status: 5 questions [score from 5 to 10]).

Siegrist's model argues that an imbalance between high extrinsic efforts and low rewards lead to emotionally and physiologically harmful reactions. To estimate the score, the ratio was calculated for each participant [12]:  $> 1$  = stress;  $< 1$  = no stress and  $0$  = balance.

Medical examination: investigators measured BP and HR among survey participants prior and after the questionnaire. Blood pressure was measured using a sphygmomanometer in accordance with the WHO reference method: the person seated, after a 5 to 10 minute rest, arms straight down at his/her sides, with the forearm supported at heart-level. Arterial pressure was considered as elevated for a systolic pressure  $\geq 140$  mmHg and/or diastolic pressure  $\geq 90$  mmHg [28]. Measurement of HR consisted in checking the radial pulse on the wrist. A HR above 96 beats/min was considered as high. The simultaneous presence of ab-

normally elevated mean vital signs allowed us to characterize a cardiac pattern: basically informed by the presence/absence of factors indicating stress-related cardiac signs [29, 30].

### Data handling

The encoding and analysis of data were performed using the SPSS™ version 18 software. The analysis process was oriented towards the identification of socio-professional factors potentially influencing the occurrence of work-related stress among individuals. Two approaches were applied: a descriptive approach of data collected on the one hand, and an analytical approach exploring the possible associations between each of the independent variables and dependent variables (stress scores according to Karasek and Siegrist) on the other hand. Crossings were performed and associations were measured using Fisher's exact test and estimation of unadjusted odds ratio (OR) in a univariate analysis. The multivariate analysis consisted of assessing the association between these variables in order to confirm the trends observed after performing the univariate analysis. We then resorted to a logistic binary regression model to establish associations between stress and the different variables. Variables used in the models were selected after applying a step-by-step degressive process based on the likelihood ratio. The lower risk category was set as the reference. Adjusted OR and their 95%-CI were derived from the final model. All covariates were tested simultaneously in a unique regression model (they are all mutually adjusted).

Matching conditions of final theoretical models were assessed by applying a Hosmer-Lemeshow test ( $\text{Chi}^2 = 4$ ;  $P$ -value = 0.86 [NS]); the detection of outliers was achieved by examining the scatter plot of standardised residues in function of probabilities predicted by the models. Tests of interaction turned out to be non-significant. A  $P$ -value under 0.05 was considered statistically significant.

## RESULTS

Table 1 summarises the description of variables studied.

The questionnaire was completed by 192 individuals. They were all male, most were married (85%) and mostly aged between 20 and 39 years old (58.5%) and 74% had a  $> 9$ -year seniority.

The « job strain » category gathered 28.1% of participants. A globally low social support, considered separately, concerned 58.3% of individuals. When including that dimension in the model, 13.5% of workers fell into the « isostrain » category.

Table 1. Description of the variables studied

| Variables                           | Categories       | N   | %    |
|-------------------------------------|------------------|-----|------|
| Age                                 | 20–39 years      | 112 | 58.3 |
|                                     | ≥ 40 years       | 80  | 41.7 |
| Seniority                           | 1–9 years        | 142 | 74.0 |
|                                     | ≥ 10 years       | 50  | 26.0 |
| Occupational status                 | Worker           | 96  | 50.0 |
|                                     | Employee         | 96  | 50.0 |
| Marital status                      | Single           | 28  | 14.6 |
|                                     | Married          | 164 | 85.4 |
| Education                           | ≤ high school    | 118 | 61.5 |
|                                     | Higher and Univ. | 74  | 38.5 |
| Alcohol                             | Yes              | 98  | 51.0 |
|                                     | No               | 94  | 49.0 |
| Tobacco                             | Yes              | 10  | 5.2  |
|                                     | No               | 182 | 94.8 |
| Work organisation                   | Good             | 110 | 57.3 |
|                                     | Poor             | 82  | 42.7 |
| Adaptation to work                  | Yes              | 144 | 75.0 |
|                                     | No               | 48  | 25.0 |
| Heart symptoms                      | Yes              | 34  | 17.7 |
|                                     | No               | 158 | 82.3 |
| Stress according to Karasek's model | Yes              | 54  | 28.1 |
|                                     | No               | 138 | 71.9 |
| Isostrain                           | Yes              | 26  | 13.5 |
|                                     | No               | 166 | 86.5 |
| Stress according to Siegrist scale  | Yes              | 42  | 21.9 |
|                                     | No               | 150 | 78.1 |

N = number of data available for each variable.

According to Siegrist's scale, 21.9% of individuals experienced stress as a result of an effort-reward imbalance.

Table 2 illustrates the number of individuals perceiving stress, according to Karasek's questionnaire and Siegrist's scale in functions of socio-demographic and organisational variables, respectively.

This table highlights that « job strain » is significantly related to: ≤ 39 year old age group, ≤ 9-year seniority, status of worker, being single, non-adaptation to work and alcohol consumption. According to Siegrist's scale, stress is significantly correlated with a ≤ 9 year seniority, the poor perception of organisation and adaptation to work on the one hand, and the occurrence of cardiac symptoms on the other hand.

In order to highlight associations between these different variables and perceived stress in the study population, a multivariate analysis was performed. Table 3 summarises the main results.

As shown in Table 3, stress is significantly associated with age (≤ 39 years old), seniority (≤ 9 years) and non-adaptation to work, whatever the approach (Karasek or Siegrist); in both cases, the strongest association is observed when considering seniority. According to Karasek's methodology, stress is additionally linked to worker status, the perception of a poor work organisation, but also to alcohol consumption. The application of Siegrist's scale showed that stress was related to a low educational level and to the occurrence of cardiac symptoms, but not to the occupational status or to the perception of work organisation.

## DISCUSSION

Studies focusing on work-related stress are scarce in African developing countries [31, 32]. They mostly targeted psychological disorders linked to professional life in hospitals [33], among taxi drivers [34], in the banking in-

Table 2. Job strain according to Karasek's model and stress based on Siegrist's scale and distribution of socio-demographic and organisational variables

| Variables/N                | Karasek                |                     |         | Siegrist           |                 |         |
|----------------------------|------------------------|---------------------|---------|--------------------|-----------------|---------|
|                            | No job strain<br>N (%) | Job strain<br>N (%) | p-value | No stress<br>N (%) | Stress<br>N (%) | p-value |
| <b>Age</b>                 |                        |                     |         |                    |                 |         |
| 20–39 years                | 82 (59.4)              | 30 (55.6)           | 0.62    | 88 (58.7)          | 24 (57.1)       | 0.86    |
| ≥ 40 years                 | 56 (40.6)              | 24 (44.4)           |         | 62 (41.3)          | 18 (42.9)       |         |
| <b>Seniority</b>           |                        |                     |         |                    |                 |         |
| 1–9 years                  | 96 (69.6)              | 46 (85.2)           | 0.02    | 104 (69.3)         | 38 (90.5)       | < 0.01  |
| ≥ 10 years                 | 42 (30.4)              | 8 (14.8)            |         | 46 (30.4)          | 4 (9.5)         |         |
| <b>Occupational status</b> |                        |                     |         |                    |                 |         |
| Workers                    | 62 (44.9)              | 34 (63)             | 0.02    | 76 (50.7)          | 20 (47.6)       | 0.72    |
| Employees                  | 76 (55.1)              | 20 (37)             |         | 74 (49.3)          | 22 (52.4)       |         |
| <b>Marital status</b>      |                        |                     |         |                    |                 |         |
| Single                     | 22 (15.9)              | 6 (11.1)            | 0.39    | 22 (14.7)          | 6 (14.3)        | 0.95    |
| Married                    | 116 (84.1)             | 48 (88.9)           |         | 128 (85.3)         | 36 (85.7)       |         |
| <b>Education</b>           |                        |                     |         |                    |                 |         |
| ≤ high school              | 83 (60.1)              | 35 (64.8)           | 0.52    | 89 (59.3)          | 29 (69)         | 0.20    |
| Higher/Univ.               | 55 (39.9)              | 19 (35.2)           |         | 61 (40.7)          | 13 (31)         |         |
| <b>Alcohol</b>             |                        |                     |         |                    |                 |         |
| Yes                        | 76 (55.1)              | 36 (66.7)           | < 0.01  | 70 (46.7)          | 24 (57.1)       | 0.23    |
| No                         | 62 (44.9)              | 18 (33.3)           |         | 80 (53.3)          | 18 (42.9)       |         |
| <b>Tobacco</b>             |                        |                     |         |                    |                 |         |
| Yes                        | 8 (5.8)                | 2 (3.7)             | 0.55    | 8 (5.3)            | 2 (4.8)         | 0.88    |
| No                         | 130 (94.2)             | 52 (96.3)           |         | 142 (94.7)         | 40 (95.2)       |         |
| <b>Work organisation</b>   |                        |                     |         |                    |                 |         |
| Good                       | 84 (60.9)              | 26 (48.1)           | 0.11    | 92 (61.3)          | 18 (42.9)       | 0.03    |
| Poor                       | 54 (39.1)              | 28 (51.9)           |         | 58 (38.7)          | 24 (57.1)       |         |
| <b>Adaptation to work</b>  |                        |                     |         |                    |                 |         |
| Yes                        | 114 (82.6)             | 30 (55.6)           | < 0.01  | 122 (81.3)         | 22 (52.4)       | < 0.01  |
| No                         | 24 (17.4)              | 24 (44.4)           |         | 28 (18.7)          | 20 (47.6)       |         |
| <b>Heart symptoms</b>      |                        |                     |         |                    |                 |         |
| Yes                        | 20 (14.5)              | 14 (25.9)           | 0.06    | 10 (6.7)           | 24 (57.1)       | < 0.01  |
| No                         | 117 (85.5)             | 40 (74.1)           |         | 140 (93.3)         | 18 (42.9)       |         |

dustry [35] or among office workers [36]. In these studies, high rates of psychological distress, occupational stress and burnout were reported.

The present study aimed at assessing the prevalence of occupational stress in a textile company and at identifying potentially associated factors, as well as their frequency among staff members. It was not possible to compare our results to other studies, as no investigation has been previously performed in that sector.

The measurement of stress level in the textile company showed that 28% of workers suffered from stress, according to Karasek's model, vs. 22% if based on Siegrist's scale. Stress level thus varies according to the approach

applied. Proportions observed in that company are close to those reported in other studies performed in both industrialised and emerging countries. In the European Union, 22% to 28% of workers were exposed to at least one factor that may adversely affect their mental well-being (Eurostat, 2009) [9]. In India, Mohan and collaborators measured a 25% rate of job strain among workers of a foundry company [37], while in a Thai rubber glove manufacturing company, job strain prevalence reached 28% according to Sein et al. [38]. Moreover, the team of Edimansyah [39] reported a 31% job strain in a Malaysian automotive assembly plant. This relative similarity of perceived stress levels might look surprising when consider-

Table 3. Associations between stress and individual, as well as organisational characteristics

| Variables                               | Unadjusted OR (95% CI) | p-value | Multiv. OR* (95% CI) | p-value |
|---|------------------------|---------|----------------------|---------|
| Job strain according to Karasek's model |                        |         |                      |         |
| Age                                     | 1.2 (0.62–2.21)        | 0.62    | 5.2 (1.78–15.45)     | < 0.01  |
| Seniority                               | 2.5 (1.09–5.75)        | 0.02    | 13.1 (3.62–45.54)    | < 0.01  |
| Occupational status                     | 2.1 (1.09–3.98)        | 0.02    | 4.1 (1.79–9.68)      | 0.001   |
| Marital status                          | 1.5 (0.58–3.98)        | 0.39    |                      | NS      |
| Education                               | 1.2 (0.63–2.35)        | 0.52    |                      | NS      |
| Alcohol                                 | 2.5 (1.27–4.73)        | < 0.01  | 6.1 (2.42–15.04)     | < 0.01  |
| Tobacco                                 | 0.6 (0.13–3.04)        | 0.55    |                      | NS      |
| Work organisation                       | 1.7 (0.89–3.16)        | 0.11    | 4.5 (1.93–10.35)     | < 0.01  |
| Adaptation to work conditions           | 3.8 (1.90–7.61)        | < 0.01  | 6.8 (2.93–15.74)     | < 0.01  |
| Cardiac symptoms                        | 2.1 (0.96–4.47)        | 0.06    |                      | NS      |
| Stress according to Siegrist's scale    |                        |         |                      |         |
| Age                                     | 1.2 (0.53–2.13)        | 0.86    | 7.1 (1.91–26.49)     | < 0.01  |
| Seniority                               | 4.2 (1.42–12.46)       | < 0.01  | 68.3 (10.04–464.68)  | < 0.01  |
| Occupational status                     | 0.9 (0.45–1.76)        | 0.72    |                      | NS      |
| Marital status                          | 1.1 (0.39–2.74)        | 0.9     |                      | NS      |
| Education                               | 1.5 (0.73–3.18)        | 0.2     | 3.1 (1.01–9.37)      | 0.04    |
| Alcohol                                 | 0.7 (0.33–1.31)        | 0.23    |                      | NS      |
| Tobacco                                 | 0.9 (0.18–4.35)        | 0.88    |                      | NS      |
| Work organisation                       | 2.2 (1.06–4.23)        | 0.03    |                      | NS      |
| Adaptation to work conditions           | 3.9 (1.91–8.23)        | < 0.01  | 3.1 (0.98–9.55)      | 0.04    |
| Cardiac symptoms                        | 18.6 (7.70–45.28)      | < 0.01  | 56.6 (14.16–226.25)  | < 0.01  |

\*OR = odds ratio; all covariates are mutually adjusted; CI = confidence interval

ing the strong cultural and economic differences between industrialised and emerging/developing countries. Indeed, several studies showed that work-related stress is often exacerbated, in developing countries, by a broad spectrum of factors external to the work environment: social inequalities, environmental pollution, poor living conditions, malnutrition and a general context of poverty [10]. It is nevertheless possible that other cultural aspects specific to those countries (such as spirituality, collective rituals and solidarity), often considered as more important than acquisition of goods or money, could act as a buffer towards stress factors [10, 31, 34].

In the present study, the multivariate analysis showed a significant association between stress and some factors such as age ( $\leq 39$  years old), seniority ( $\leq 9$  years), worker status, the perceived non-adaptation to work and the poor perception of work organisation, as well as alcohol consumption, according to Karasek's model. Partly similar trends were observed when applying Siegrist's model: associations were observed between stress and age, seniority, a low education level, the non-adaptation to work and the occurrence of cardiac symptoms. Among all these associations, odds ratios concerning less risky categories re-

mained above 4. The CI is more important, likely due to proportion changes in the categories of variables.

Although stress seemed to affect everyone in the company, workers showed a four-fold higher risk of stress compared to employees. These results confirm the findings of Tsutsumi et al. in Japan [40], Bourbonnais et al. in Canada [41] and the results of Lotfizadeh et al. in Iran [42]. However, they differ from studies performed in Belgium by Clays and collaborators [15, 29], who reported a higher level of stress among employees.

Stress was also related to age and seniority. In both models, the risk of suffering from stress was higher among younger individuals and those having a  $< 10$  year-seniority. Van Daele [43], as well as Bourbonnais et al. [41], noted that young people were more affected by stress because of less professional experience and less theoretical knowledge to face challenges; furthermore, they often struggle to manage work organisation and financial problems. Lotfizadeh's team [42] reported similar results in Iran. According to these authors, everything that contributes to additional experience could be a support against stress; through experience, individuals acquire confidence and self-esteem, as well as a decision-making leeway. Never-

theless, conflicting results were reported in surveys performed in China by Manshor *et al.* [44] and in India by Mohan [37]: both observed a higher stress level among older workers. In Karasek's approach, no stress difference was observed in relation with education level, contrary to the results obtained with Siegrist's model: individuals with secondary qualifications, or less, have a three-fold higher risk of suffering from stress compared to people with tertiary qualifications. That observation confirms the results of previous studies [40–42, 45]. Our investigation also revealed a relationship between stress and cardio-vascular indicators, according to Siegrist's model. Stress may also be responsible, among others, for a variety of psychosomatic diseases or adaptation diseases (mental health disorders and cardio-vascular diseases). These results confirm the findings of previous studies [13, 40, 46–48].

In our study, alcohol consumption was also associated with stress. In numerous countries, alcohol and tobacco are perceived as socially acceptable drugs, and DRC is no exception.

In fact, alcohol is viewed by many people as a stress reducer. Nevertheless, the association is controversial; studies carried out by Gimeno *et al.* [49], Heikkilä *et al.*, as well as the work of Kouvonen's team [50–53], highlighted the bi-directional relationships between stress and these drugs.

In our study, stress was also associated with the perception of a bad adaptation to work and a poor work organisation. Previous works reported the role of both factors in the occurrence of work-related stress [8, 11, 14, 54–57]: a good work organisation reduces stress, increases motivation, and thus participation, as well as workers' compliance and the company performance.

Stress-associated factors depended on the model used. Karasek's model allowed linking work experience and occupational risk. It covered aspects of both quantitative and qualitative psychological workload as well as work resources, which may be related to work organization and labour status. The consecutive consumption of alcohol is then perceived as a stress reducer. Siegrist's model relied on the hypothesis that a work situation combining high effort and low reward generates pathological responses emotionally and physiologically. Workers having a low educational level are less rewarded although they make considerable efforts.

#### BIAS AND LIMITS

The main limitation of our survey is that it only included people from a single company, which could limit the extrapolation of these results to all workers/employees

in the DRC textile industry. Another potential limitation arise from the labour force involved in the study: the number of people included was finally half the recommended sample size. Nevertheless, despite the reduced sample, several significant associations were observed. Results recorded for cardio-vascular indicators should be considered with caution to the extent that HR and BP might have been affected by the moment and conditions of measurement. The « healthy worker effect » [58] may also be seen as a bias, as the individuals sick-listed at the time of study had no access to the survey. Information on income and race was not collected from the participants, although these parameters may be relevant in the evaluation of occupational stress; nevertheless, DRC is a developing country, not immune to poverty, and incomes are thus very low compared to industrialized countries. Furthermore, the society is not as multicultural [59].

#### CONCLUSION

The present study investigated stress among individuals working in a textile company in DRC. It reveals that stress level and associated factors differ according to the approach (either Karasek's or Siegrist's), but both models offered complementary information, thus increasing the probability of assessing workers' health accurately. Stress measurements reached levels similar to other studies in both industrialised and developing countries. This may be attributable to the potential buffer role played by cultural factors specific to developing countries [10]. This hypothesis deserves further investigation, taking into account stress factors outside the work environment. It would be interesting to explore stress perception using qualitative methods.

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#### CONFLICT OF INTEREST

The authors declare there is no conflict of interest.

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