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Risk Factors and Economic Impact of Musculoskeletal Disorders in Employees of a Port Operations Company in Southwestern Côte d'Ivoire in 2020

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Abstract

Introduction: Musculoskeletal disorders are a group of multifactorial disorders with occupational components, whose high prevalence and occupational and economic impact make them a public health problem. **Materials and methods:** In order to study musculoskeletal disorders in workers at a port company in 2020, we conducted a cross-sectional study from 2 November 2020 to 2 February 2021. Data were collected using the INRS 2000 MSD questionnaires, the SALTSA method and the Quick Exposer Check. The economic costs of MSDs were assessed and the data was processed using Epi info7 and Excel 2013 software. **Results:** The sample of 125 out of a workforce of 206 workers comprised employees with an average age of 42.83 ± 7.5. The average job tenure was 12 years ± 4 years, with an extreme of 22 years and 62 years. Administrative staff, finance officers and firefighters accounted for 51.2% of the workforce. The prevalence of MSDs was 91.2%. Low back pain accounted for 66.6% of MSDs; 32% of workers handled moderately heavy to very heavy loads. Prolonged sitting posture and screen work were the main biomechanical risk factors. The cumulative number of days not worked over the two years was 1,181. The overall cost of MSDs was estimated at €329,773.25, or 92.67% of the total cost of MSDs. The cost of productivity was €269,080.17, or 81.59% of the overall cost of MSDs. **Conclusion:** The prevalence of MSDs and their economic cost require the implementation of an effective prevention programme.

Keywords

MSDs, Prevalence, Risk Factors, Economic Impact, Ivory Coast

1. Introduction

Musculoskeletal disorders (MSDs) are a group of multifactorial conditions with occupational components that affect the peri-articular soft tissues, including muscles, tendons, nerves, joints, cartilages, and menisci. These disorders primarily manifest as pain and functional limitations in one or more joints [1]-[3]. Typically, they arise from a combination of biomechanical, personal, and organizational factors that disrupt the balance between workers' functional capacities and the demands of their jobs [1].

Regarded as a "pandemic in the workplace", MSDs are prevalent across various industries, posing a significant public health challenge due to their high incidence and the serious socio-economic and professional impacts they entail [4]-[6].

In the United States, MSDs constituted between 29% and 35% of all occupational illnesses from 1992 to 2010 [6]. Similarly, in 2016, MSDs accounted for 41% and 65% of work-related diseases in Great Britain and Korea, respectively, with their economic impact estimated to be 40% of global work-related illness costs [7]-[9].

The economic burden of these disorders is primarily due to costs associated with the absenteeism of skilled and experienced workers, leading to decreased productivity, opportunity costs, and medical treatment expenses.

Between 1994 and 2002, in Washington State, USA, the annual productivity loss attributed to MSDs was estimated to be approximately 3.3 billion dollars [10]. Additionally, these disorders are among the leading causes of disability worldwide [11].

In Africa, MSDs have been investigated in various studies. For instance, in Tunisia, Nada Kotti et al reported in 2016 a 41.02% prevalence of low back pain among machine operators, mainly associated with biomechanical factors [12]. Similarly, J Muzembo Ndundu *et al*., in a study conducted in Kinshasa, identified a 25.2% prevalence of chronic low back pain in a transport company, primarily linked to ergonomic and psychosocial factors [13].

In 2019, musculoskeletal disorders (MSDs) were the most frequently reported compensable occupational diseases in Côte d'Ivoire, as documented by the social security fund reports. Employees face exposure to MSD risk factors during activities such as manual handling of heavy loads, maintaining awkward working postures, exposure to mechanical vibrations, and repetitive motions. This study was prompted by the rising incidence of lower back pain and other musculoskeletal complaints within a port company. Its objective was to decrease the prevalence of these peri-articular pains and to enhance the quality of the working environment.

1.1. General Objective

To investigate musculoskeletal disorders among employees of a port industry company in 2020 and know the prevalence of MSDs in a port company, as well as related variables and associated costs.

1.2. Specific Objectives

1) To ascertain the prevalence of musculoskeletal disorders (MSDs) among the employees of the company under study in 2020 and its relationship with the variables: age, sex, and type of work.

2) To identify the various anatomical locations of diagnosed MSDs among the company's employees in 2020.

3) To describe the occupational risk factors associated with the diagnosed MSDs among the company's employees in 2020.

4) To assess the economic impact of the identified MSDs on the company in 2020.

2. Materials and Methods

2.1. Study Type, Setting, and Duration

This research was a cross-sectional, descriptive investigation into musculoskeletal disorders that emerged in 2020 within a port operations company based in San-Pedro, Côte d'Ivoire. The study was conducted over a three-month period, from November 2, 2020, to February 2, 2021.

2.2. Study Population

The study population included all company workers, including employees, interns, and contractors.

Sampling

We carried out an exhaustive sampling of all workers meeting the inclusion criteria, with voluntary participation and consent from the company and the workers to the use of the data for epidemiological purposes, while preserving their confidentiality.

Inclusion Criteria

Participants included in the study were personnel regardless of gender or job position, aged 18 years or older, with a minimum of six months of professional tenure, who consented to participate in the study and were present during the data collection period.

Exclusion Criteria

We were unable to include in this study any personnel who were

- contractual or interns,
- suffering from infectious joint pathologies or being on sick leave for any medical reason,
- with a history of joint trauma.

2.3. Data Collection Instruments

The data were gathered using a survey based on the following validated questionnaires:

- TMS INRS (National Institute for Scientific Research) October 2000 version, which provides information on complaints related to musculoskeletal disor-

ders (MSDs) [14];

- SALTSA method, a tool for detecting upper limb MSDs in the workplace based on early signs [15];
- Quick Exposer Check: a tool that evaluates whether a worker, while performing their tasks, is exposed to risks of musculoskeletal disorders affecting the most frequently used body segments (hand, wrist, elbow, shoulder, neck, back). This tool provides information on the risk factors for MSDs [16].

This method enables the calculation of scores to assess the risk level. The measurement of risk is achieved through the combination of responses from both the observer and the worker. A high-risk level necessitates immediate corrective action, while a medium-risk level permits the deferral of intervention within a reasonable time frame. Conversely, a low-risk level allows for an observational approach. The results obtained furnished critical information for initiating a preventive strategy. (**Table 1**)

Table 1. Distribution of risk levels based on obtained scores [16].

Body Segments	Scores and Corresponding Risk Levels		
	Low	Medium	High
Back	10 - 28	30 - 42	44 - 56
Shoulder and arm	10 - 28	30 - 42	44 - 56
Wrist and hand	10 - 14	26 - 34	36 - 46
Neck	4 - 14	16	18

2.4. Body Mass Index (BMI, WHO) [17]

Interpretation of body mass index.

(BMI)	Interpretation (as per WHO guidelines)
Below 18.5	Underweight (thinness)
18.5 to 25	Normal weight
25 to 30	Overweight
30 to 35	Moderate obesity
35 to 40	Severe obesity
Above 40	Morbid or massive obesity

2.5. Methodology

2.5.1. Data Collection Approach

With the management's approval, our study commenced with an initial phase focused on increasing awareness among employees about musculoskeletal disorders. Following this, we conducted visits to each department to distribute survey forms to the workers. Subsequently, the workers were invited to the company's medical facility for a clinical examination. This examination assessed all body joints using the SALTSA method [15]. The questionnaire was completed through an interview with the staff, which was then followed by the clinical examination. Diag-

nostic data were gathered during an examination conducted in accordance with the SALTSA method. This method, developed by the INRS, serves as a tool for detecting early signs of upper limb musculoskeletal disorders in the workplace. Its purpose is to refine prevention strategies and enhance the epidemiological monitoring of musculoskeletal disorders.

2.5.2. Economic Cost of MSDs

The economic impact of musculoskeletal disorders (MSDs) has been evaluated based on the criteria outlined in Table 2 below.

Table 2. Parameters of the socio-economic impact of MSDs [17].

Socio-economic Parameters	Definition	Formula
Direct Cost (CD)	Health-related expenses directly associated with managing musculoskeletal disorders (MSDs)	Costs for consultations + pharmacy + hospitalization + imaging + functional rehabilitation
Indirect Cost (CI)	Expenses resulting from employee absenteeism	Absenteeism cost (Cabst) + Opportunity cost (Cp)
Absenteeism cost (Cabst)	Calculated as the average salary multiplied by the total monthly absenteeism	Average monthly salary × total absenteeism (months)
Opportunity cost (Cp)	Represents the potential earnings the company lost due to MSDs	Revenue × total months of absenteeism ÷ (number of employees × 12)
Total Cost	The comprehensive cost of MSDs within the company, combining both direct and indirect costs	Direct Cost (CD) + Indirect Cost (CI)

Euro/XOF exchange rate on 27/03/2025. 1 euro = 655.957 XOF.

2.5.3. Data Analysis

The data gathered were inputted and analyzed utilizing Word and Epi Info 7 software. Graphical representations were generated using Excel 2013. Quantitative data are characterized by mean and standard deviation, while qualitative variables are represented by proportions.

2.5.4. Ethical Considerations

This research was carried out with the approval of the company's management. The findings are exclusively used for scientific and social objectives, adhering strictly to the confidentiality of the collected data. No conflicts of interest are reported.

3. Results

3.1. Workforce Composition

The study sample included 125 workers from a total workforce of 206, achieving an inclusion rate of 60.67%.

3.2. Socio-Demographic and Occupational Characteristics

3.2.1. Age and Gender

The workers had an average age of 42.83 years with a standard deviation of 7.5,

ranging from 24 to 62 years. Participants aged between 40 and 49 constituted 51.2% of the total; 73.6% were male, resulting in a sex ratio of 2.78.

3.2.2. Body Mass Index and Handedness

In this cohort, 41.6% of workers were classified as overweight, 25.6% as obese, and 89.6% were right-handed.

3.2.3. Length of Professional Experience

The average length of professional experience was 12 years with a standard deviation of 4 years, ranging from 2 to 42 years. Participants with 10 to 14 years of experience constituted 46% of the total sample.

3.2.4. Workstation

Table 3. Allocation of workers by workstation.

Department	Headcount	Percentage (%)
Medical Department	6	4.8
Quality, Hygiene, and Safety	8	6.4
Administrative Services	25	20
Financial Department	21	16.8
IT and Communication	10	8.4
Infrastructure and Technical	16	12.8
Legal Department	2	1.6
Fire and Rescue Services	18	14.4
Port Authority Police	19	15.2
Total	125	100

The workforce composition included 20% administrative staff, 16.8% finance agents, and 14.4% firefighters, collectively accounting for 51.2% of the total personnel. (Table 3)

3.3. Data on Musculoskeletal Disorders (MSDs)

3.3.1. Prevalence

Within a sample of 125 workers, 114 individuals reported experiencing musculoskeletal disorders (MSDs) over the past 12 months, indicating a prevalence rate of 91.2%.

The breakdown of MSDs by anatomical location is detailed in Table 4.

- Anatomical Location of MSDs

Table 4. Distribution of MSDs by anatomical location.

Body Region	Number of Cases	Percentage (%)
Neck	56	49.1
Upper spine	48	42.1

Continued

Lower spine	76	66.6
Shoulder	31	27.2
Elbow	12	10.5
Wrist/Hand	35	30.7
Knee	41	36
Ankle/Foot	29	25.4

The reported musculoskeletal disorders were found in the lumbar spine, cervical spine, and dorsal spine at rates of 66.6%, 49.1%, and 42.1%, respectively.

- Symptoms

Clinical signs indicative of this risk were assessed using the Saltsa method, which identified dorsolumbar pain in 66.6% of cases and cervical pain in 32% of cases.

3.3.2. Identified Risk Factors for Musculoskeletal Disorders (MSDs)

- **Workload**

Table 5. Distribution of workers based on their perception of workload

Items		Frequency	Percentage (%)
Effort	Light load	85	68
	Moderately heavy load	29	23,2
	Heavy load	8	6,4
	Very heavy load	3	2,4
Duration of Effort	Less than 2 hours	36	28,8
	Between 2 and 4 hours	18	14,40
	More than 4 hours	71	56,8
Force Exerted	Low	91	72,8
	Moderate	20	16
	High	14	11,2
Précision visuelle	Low	90	72
	High	35	28
Movement Alternation	Never	93	74,4
	Occasionally	29	23,2
	Frequently	4	2,4
Stress Level	Minimal or no stress	95	76
	Moderately stressful	11	8,8
	Highly stressful	19	15,2

Efforts to manage heavy loads and their variation were noted in 32% of the workforce, with over 56.80% of cases involving more than 4 hours dedicated to the task. Additionally, high visual precision was required for these activities in 72.60% of

cases, and 24% of workers reported finding their tasks stressful. (Table 5)

- Biomechanical Factors

Workers identified prolonged static sitting posture (75.2%) and screen work (71.2%) as the primary biomechanical risk factors.

- **Posture**

Table 6. Distribution of workers based on the observed postures.

Items		Frequency	Percentage (%)
Position/level of stress of the neck	Neutral	27	21.6
	Occasional demands	77	61.6
	Frequent demands	21	16.8
Back position	Neutral	54	43.2
	Moderately forward-flexed	48	38.4
	Highly forward-flexed	23	18.4
Back Support	Stationary	65	52
	Alternating	60	48
Elbow Position	Waist height	65	52
	Chest height	60	48
	Shoulder height	0	0
Shoulder Demand	Occasionally	38	38.4
	Frequently	54	43.2
	Very frequently	33	26.4
Hand/Wrist Position (Flexion/Extension/Deviation Movements)	10 fois/min	27	21.6
	11 - 20 fois/min	77	61.6
	+20 fois /min	21	16.8

The restrictive gestures and postures identified among numerous workers included frequent strain on the neck, bending of the back, static positioning of the back, elevation of the elbow to the level of and beyond the thorax, and excessive strain on the shoulders, with hands and wrists in motion. (Table 6)

- **Risk Level**

The assessed risk levels for each body segment are presented in Table 7.

Table 7. Distribution of workers based on the risk levels of musculoskeletal disorders (MSDs) by body segment.

Body Segment	Risk Level	Frequency	Percentage (%)
Cervical Region	Low	68	54.4
	Moderate	39	31.2
	High	18	14.4
Lumbar Region	Low	83	66.4
	Moderate	42	33.6
	High	00	0

Continued

Shoulder-Arm	Low	70	56
	Moderate	54	43.2
	High	01	0.8
Wrist-Hand	Low	54	43.2
	Moderate	56	44.8
	High	15	12

The risks were significant in the regions of the neck, the shoulder-arm, and the wrist-hand segment.

3.4. Consequences of Musculoskeletal Disorders

3.4.1. Work Absences and Days Not Worked

In 2019 and 2020, musculoskeletal disorders led to the issuance of 328 medical certificates for work absences or temporary work interruptions (TWI). The number of days not worked due to these TWIs is outlined in Table 8.

Table 8. Annual distribution of lost working days.

Year	≤3 jrs	4 - 7 jrs	8 - 15 jrs	16 - 30 jrs	>30 jrs	Total duration
2019	300	15	23	67	404	809
2020	159	21	15	42	135	372
2019-2020	459	36	38	109	539	1181

The cumulative ITT for the two-year period resulted in a total of 1181 days of work absence, which is equivalent to three years, two months, and 13 days.

3.4.2. Costs Associated with Musculoskeletal Disorders

Table 9. Distribution of costs attributable to musculoskeletal disorders.

Socio-economic parameters		2019	2020	Total en XOF
Direct cost	Specialized rheumatology consultation	886,950	116,060	1,003,010
	Medical imaging	870,000	400,000	1,270,000
	Pharmaceutical expenses	648,000	216,000	864,000
	Purchase of adapted wheelchairs	10,799,071	1,100,000	11,899,071
	Rehabilitation	439,200	387,500	826,700
Total directcosts		13,643,221	2,219,560	15,862,781
Indirect costs	Cost of absenteeism	16,653,089	7,296,206	23,949,295
	Opportunity cost	101,827,058	74,677,871	176,504,929
Total indirectcosts		118,480,147	81,974,077	200,454,224
Total cost		132,123,368	84,193,637	216,317,005

The overall cost of musculoskeletal disorders (MSDs) amounted to 216,317,005 XOF (329,773.25€), with indirect costs accounting for 200,454,224 XOF (305,590.65€), which constitutes 92.67% of the total MSD costs.

The cost related to productivity loss, or opportunity cost, was 176,504,929 XOF (269,080.17€), making up 81.59% of the total MSD costs.

4. Discussion

Limits of the study

There are methodological limitations to this study. Selection bias associated with the exclusive inclusion of salaried workers could underestimate the prevalence of low back pain. The cross-sectional design and potential self-reporting bias are also limitations. The use of retrospective data certainly led to information bias, particularly in the case of under-reporting or reporting errors.

Another source of weakness in the study could be related to the differences in salaries between the occupational groups, which is perceived as a limitation in the evaluation of the economic cost.

Musculoskeletal disorders (MSDs) represent a category of conditions that emerge from the interplay of multiple risk factors. Prominent among these are individual or personal factors such as age, gender, length of service in the position, and medical history [18]-[20].

The study's workforce, predominantly male, had an average age of 42 years, ranging from 24 to 62 years. As individuals age, their susceptibility to lower back pain increases due to the physiological aging of soft tissue functional capacities, reduced stress resistance, and decreased muscle strength, which contribute to the frailty of older individuals [21]. The male predominance in the sample contrasts with literature findings, which typically indicate a female majority [19] [22]-[24]. This male predominance may be attributed to the demographic composition of the general population, which is dominated by young men in developing countries, as well as the physical nature of the work involved. The majority of this population had been employed for approximately 12 years. Such prolonged exposure, identified as a risk factor for musculoskeletal disorders (MSDs), was documented by Ouédraogo and Troussier, who reported 31.4% and 37.9% prevalence in their respective study populations [24] [25]. Frequent and sustained joint use over time results in lesions from repeated microtraumas, as described by the biomechanical theory of MSD development [26]. This extensive exposure duration accounts for the occurrence of MSDs in nearly all workers (91.2%) over the past year. (**Table 5**)

It is observed that more than half of the workforce consists of office employees. These roles are predominantly sedentary, involving prolonged periods of sitting. This extended static posture is linked to sustained muscular activity, which may result in the overloading of muscular structures and increase the risk of musculoskeletal disorders (MSDs). (**Tables 3-6**) While seated work does not require significant physical exertion, it can still lead to a variety of MSDs when performed

over extended durations and under constrained postural conditions.

Additionally, the working environment for office employees is typified by intense cognitive demands, extensive hours spent at a computer, and the frequent use of a keyboard and mouse within a stressful setting. These factors are widely acknowledged as contributing to the incidence of MSDs among this group of workers (see **Table 5**) [27]-[31].

In addition, certain job roles, such as those of port police officers and firefighters, are notable for their specific characteristics. Port police officers conducted daily foot patrols covering 4 to 5 kilometers and climbed ladders to board vessels. Firefighters managed heavy loads manually, ranging from 9 kg to 144 kg, and operated 5-ton pump trucks, which are heavy vehicles that generate vibrations. These working conditions place continuous stress on the workers' joints, making them susceptible to soft tissue injuries around the joints.

Contrary to common beliefs and traditional views, musculoskeletal disorders (MSDs) are not limited to workers who engage in intense physical activities. They also occur in professions involving more sedentary tasks, particularly in office settings where computer usage has been linked to MSDs such as neck pain and trapezius myalgia (**Tables 3-6**) [30] [31].

Prolonged seated activities with intricate tasks, such as working on a computer screen for over two consecutive hours or data entry, are common. Musculoskeletal disorders (MSDs) predominantly affect the spine. Clinical examination using the SALTSA method confirmed the lumbar region as the primary site of pain (65.6%). (See **Table 4**) In occupational settings, spinal issues are the foremost cause of osteoarticular morbidity. Alternating back postures (48%) was observed to be beneficial, as it facilitates joint relaxation. We noted that elevating the elbow to or above the thorax (48%) can lead to tension, fatigue, and shoulder pain if maintained or repeated for extended periods. Furthermore, tasks involving arms above shoulder level, lifting heavy loads, and repetitive arm abduction movements increase the risk of MSDs. (**Table 1**)

Frequent wrist flexion and gripping motions have been identified as causes of carpal tunnel syndrome (1 case), primarily due to compression at the base of the hand during computer data entry tasks.

Our findings indicate a significant risk of musculoskeletal disorders (MSDs) of the wrists and hands in 12% of the workforce. Consequently, this necessitates the implementation of priority measures to prevent MSDs affecting the hands and wrists.

The repercussions of these disorders include absenteeism and its associated costs, healthcare expenses, costs for workplace modifications, and opportunity costs as shown in **Table 2** and **Table 9**.

Specifically, in 2019 and 2020, MSDs resulted in 209 and 119 instances of sick leave, respectively. These absences accounted for 26.9 months (2019) and 12.4 months (2020) of lost work time, equating to 1181 non-working days over two years, with a financial loss of 23,949,295 FCFA. MSDs thus pose a significant chal-

lenge to company productivity and sustainability, given their multifaceted impact. They lead to absenteeism and disrupt team dynamics. (Table 2)

In addition, our study found that the productivity cost, or opportunity cost, amounted to 176,504,929 CFA francs, representing 81.59% of the overall cost. The indirect costs were calculated at 200,454,224 CFA francs, accounting for 92.67% of the total cost, while direct costs were 15,862,700 CFA francs, corresponding to 7.33% of the total cost associated with musculoskeletal disorders (MSDs). This indicates that the financial impact of MSDs in the workplace is predominantly influenced by indirect costs.

5. Conclusions

The prevalence of MSDs was 91.2%. Almost all the workers reported having suffered from them in the last 12 months. These disorders mainly affected the lumbar spine, cervical spine and dorsal spine, and were generally the result of prolonged average physical effort in a context of stress, and awkward movements and postures, with a relatively high level of risk in the cervical, shoulder-arm and wrist-hand areas.

These problems have resulted in many days not working, at a total cost of XOF 216,317,005 (€329,773.25). These disorders should be prevented by applying preventive measures based on postural education.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Questionnaire—Travailleur

SURVEY FORM/QUESTIONNAIRE

Poste

1. SOCIO-PROFESSIONAL DATA

1- Sex: a-male /__/ b-female /__/

2- Age: …… ans.

3- Height

(cm): ……/_____/

4- Weight (Kg): …… /_____/

5- BMI……(taille/m^2)

6- /__/ Right-Handed /__/ Left-Handed /__/ Ambidextrous

7- Matrimonial situation:

a- single /__/ b- married /__/ c- cohabiting partner /__/ d- widow / widower /__/ e- divorced /__/

8- Profession: ……..……

9- Service: ……..……..

10- Professional seniority: ..... Years.

11- Number of hours worked per week: ..... Hours.

12- Type of work organization: a- Shift work /__/ b-Fixed schedule/__/

I. DATA ON MUSCULOSKELETAL DISORDERS

Have you had any problems (aches, pain, discomfort) in the last 12 months with your	**On average, how intense is this problem?** **Low = 1** **moderate = 2** **strong = 3** **insupportable = 4** **not concerned = 5**	**How common was this problem?** **1. Almost never = 1 (every 6 months)** **2. rarely = 2 (every 2 or 3 months)** **3. sometimes = 3 (monthly)** **4. frequently = 4 (every 8 days)** **5. almost always = 5(every day)** **- not concerned = 9**
of the neck?		
From the upper back?		
Lower back		
Shoulder		
Elbow		
Wrist		
Main		
Knee		
Ankle – foot		
Other …… (specify)		

H. Effort The load you are handling appears to you:	**1**	Light
	2	Medium Heavy
	3	Heavy
	4	Very heavy

Continued

J. Duration How many hours on average per day do you devote to this job or task?	**1** **2** **3**	Less than 2 hours 2 to 4 hours More than 4 hours
K. Force You must, with your hand, force	**1** **2** **3**	A little Averagely A lot
L. Visual Accuracy The level of visual accuracy you need is	**1** **2**	Low (no need to see details) high (need to see details)
M. Vehicle Vibration Do you drive a vehicle to work? If so, for how many hours per day	**1** **2** **3**	Never or less than an hour Yes, from one to 4 hours Yes, more than 4 hours
N. Hand Tool Vibration Do you use hand tools that vibrate? If so, for how many hours a day?	**1** **2** **3**	Never or less than an hour Yes, from one to 4 hours Yes, more than 4 hours
P. Rhythm Are you having trouble keeping up with the pace of production?	**1** **2** **3**	Never Sometimes Often
Q. Stress In general, how do you find your job?	**1** **2** **3**	Not or low stress Quite stressful Very stressful

II. EXAMEN GENERAL

CLINICAL EXAMINATION (DOCTOR) **According to Salta**		**Right**	**Left**
NECK	Active movements of the cervical spine		
	Rotation passive du rachis cervical		
SHOULDER	Painful arch test during abduction		
	Active shoulder elevation		
	Thwarted abduction of the glenohumeral joint		
ELBOWS	Thwarted elbow flexion		
	Upset wrist extension		
WRIST	Test de Finkelstein		
	Carpal tunnel flexion/compression		
HAND	Tinel's Test		
	Test the Phalen		

Continued

RACHIS	Pain on pressure of the spinatus vertebrae of the dorsal vertebrae
	Pain on pressure of the spinatus vertebrae of the lumbar vertebrae
	Point
	talon
	Finger-to-Ground Distance
	Indice de Schobert
	Star of Maigne
	Lasègue
	Léri
KNEE	Pain on percussion—mobilization
	Plane
	Patellar shock
	Tendinitis
ANKLE—FOOT	Pain on pressure of the Achilles tendon
	Foot flexion
	Foot extension

Questionnaire—Observer

Poste:

DESCRIPTION OF THE TASK BEING EVALUATED:

A. Dos Position of the back during labor, is:	**1**	In a neutral or nearly neutral position
	2	Moderately flexed (forward or sideways) or rotating
	3	Very strongly flexed (forward or sideways) or rotated
B. Back—Frequency of Movement Does the worker handle (lift, move, push, pull, carry a load, even a light one)? **If no, answer B1 or B2 only.** **If yes, answer B3, B4, or B5 only.**	**1**	The worker stays in the same position most of the time
	2	The worker does not stay in the same position most of the time
	3	The worker does occasional handling. **(Approximately 3 times per minute)**
	4	Worker frequently handling **(about 8 times per minute)**
	5	The worker does handling very frequently.**(about 12 times per minute)**

Continued

C. Shoulder/Arm—Position	**1**	Waist-high
	2	At chest height
How high is the elbow?	**3**	At or above shoulder height
D. Shoulder/Arm—Frequency of Movement	**1**	Occasionally (from time to time)
	2	frequently (regularly with stops)
The worker makes the movement that solicits his shoulder and arm	**3**	very frequently (almost continuously)
E. Wrist/Hand—Position	**1**	In a neutral position most of the time
What position are the worker's wrists and hand in?	**2**	In extension, bending or deflection
F. Wrist/Hand—Frequency of Movement	**1**	10 times per minute or less
	2	11 to 20 times per minute
How many times does the worker make this movement of the wrist and hand?	**3**	More than 20 times per minute
G. Cou—Position	**1**	No, if the head is straight
	2	Yes, occasionally
Does the worker have to turn or tilt his head to accomplish his task?	**3**	Yes, frequently
Q. Stress	**1**	Not or low stress
	2	Quite stressful
In general, how do you find your job?	**3**	Very stressful