



(ASSESSMENT OF QUALITY AND PRODUCTIVITY WORK LIFE IN COVID-19 PANDEMIC) Contribuições da Engenharia de Produção para a Gestão de Operações Energéticas Sustentáveis

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Studying human relations and work during a pandemic period can be a key factor in helping the public and private authorities to make the best adjustments to their work with all existing protocols and work models. This article is the result of a statistical-based survey to understand the quality of work of the population and its productivity during the COVID19 pandemic.

Keywords: Ergonomics, Occupational Engineering, Occupational Medicine, Statistical Analysis, Pandemic, COVID-19, Quality Engineering, Productivity

1. INTRODUCTION

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) spread rapidly across multiple countries in early 2020 (GUDBJARTSSON *et al.*, 2020). With purpose to reduce the transmission of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), an estimated 4.5 billion people globally have been placed under some form of lockdown restriction. Modelling and early empirical investigations indicate that physical distancing measures are crucial to reduce transmission of the virus, consequent pressure on health systems, and the number of deaths (DRAKE *et al.*, 2020).

In addition to the millions of people infected by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), hundreds of thousands have died—and will die—from COVID-19. An anticipated wave of mental and behavioral problems is beginning to be documented—compounded by social and economic stressors and uncertainties—that will likely present a population health burden for months and years to come (GALEA, 2020). Isolation can bring unpredictable consequences, with potential illnesses and domestic, mental, and work problems. Working in quarantine can be a challenge for several reasons. The new home office work models, even the face-to-face model with all the sanitary protocols and the hybrid models, diversify the ways in which work can be done. However, bodily, and mental injuries and various problems can occur in these adaptations. The term injury was recognized by a government agency in 1992 to be an inaccurate and misleading term, and the term work-related upper limb disorder was suggested as an alternative (COUNCIL, 1992). The work of occupational medicine, in the field of ergonomics, can play a fundamental role in identifying these problems. Clinicians must understand that the physical and psychosocial characteristics of work (and nonworkplace settings) can profoundly affect their patients’ wellbeing and produce various musculoskeletal disorders. Physicians have a crucial role in the early recognition of these disorders and in stimulating appropriate ergonomic interventions to reduce their frequency and severity (YASSI, 1997). Also understanding the quality of work developed in the adaptation of work to the pandemic can be an important factor for the implementation of public policies and legislation for companies to help in this process.

These studies were scarce at the beginning and throughout the pandemic. However, when carried out in the form of research, they can bring data that influence the decision-making of public bodies and the private sector itself. This paper aims to assessment the quality of work in pandemic time, considering medical and ergonomic aspects, as well as introduces qualitative

variables to understand the adaptations of the population's work during the new corona virus pandemic.

2. MATERIALS AND METHODS

2.1. Participants

Eight hundred and one participants from various regions of Brazil (North, Northeast, Midwest, Southeast and South) with different age groups. All participants were volunteered for response the research. The research was applied between the months of April to June 2020 and the analyzes were carried out between the months of July to December of the same year.

2.2. Instruments

The questionnaire consisted of 24 questions about quality of your work in times of pandemic. There is a reservation that these 24 questions have different types of response as Likert scale (five points) or options scale to allow more information of the issues and correlate certain types of data that we consider useful for the analysis development of the research. The 24 variables defined for modelling from survey were planned with focus in work environment and productivity. The statistical analysis was performed using the SPSS 25[®] software.

2.3. Statistical Analysis

We conducted statistical analysis to assessment the quality of work, considering some medical and ergonomic variables aspects. The data were tested for assumptions that should be met when using a correlation test between paired questions, which means that the medical and ergonomic variable should be statistically significance, and there should be correlation between the investigated aspects.

The Cronbach's alpha coefficient is an internal consistency measure, which adds a set of items as a group by the average correlation among them - items. It is considered, therefore, a statistic that measures the reliability of a questionnaire on a numerical scale from zero to one, where 0 would represent no consistency and 1 high reliability (BOHRNSTEDT, 1969). Although it was obtained through software in this study, the calculation of Cronbach's alpha coefficient is given by,

$$\alpha = \left(\frac{k}{k-1} \right) * \left(1 - \frac{\sum_{i=1}^k S_i^2}{S_t^2} \right) \quad (1)$$

where: k is the number of questionnaire items; S_i^2 corresponds to the variance of each item; S_t^2 is the total variance of the questionnaire, determined as the sum of all the variances.

3. RESULTS AND DISCUSSIONS

3.1. Respondents Profile

The number of interviews who completed the questionnaire was 801, considering the sample size with a confidence level of 95% and maximum error of 5%. The sample size was 801 responses, and the respondents characterized a response profile through some basic questions, such as age, region of residence and work, height, area of profession and model of work. Regarding age, the profile of the respondents is mostly in the age group of 18 to 39 years, with 82.49% of the total, as well as more than 90% are in the northeast and southeast regions of Brazil. The profile of the area of regular occupation, be diversified, with a high number of respondents in industrial area, as chemistry, administration, and engineering.

Figure 1. Frequency distribution to Age group

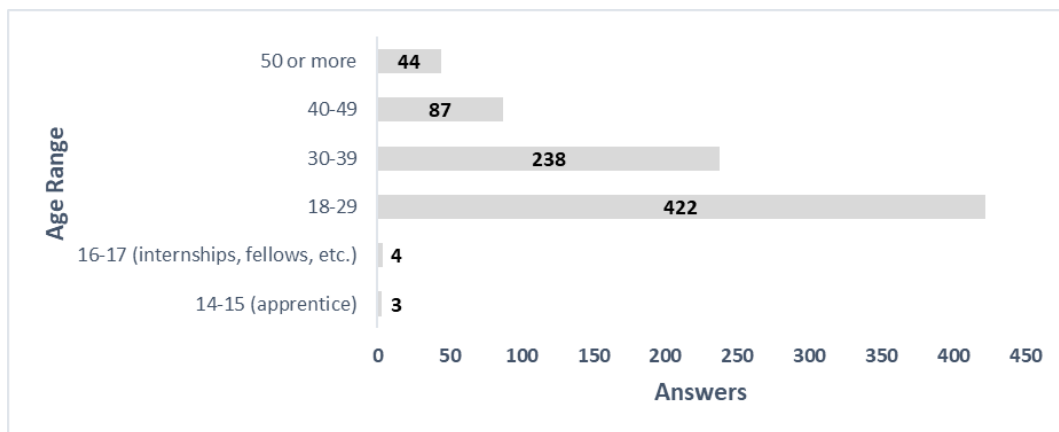
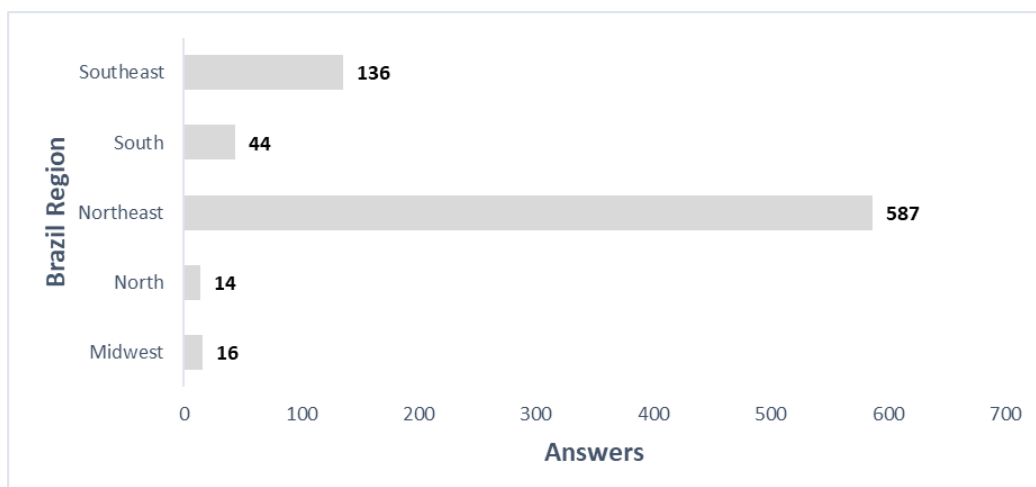
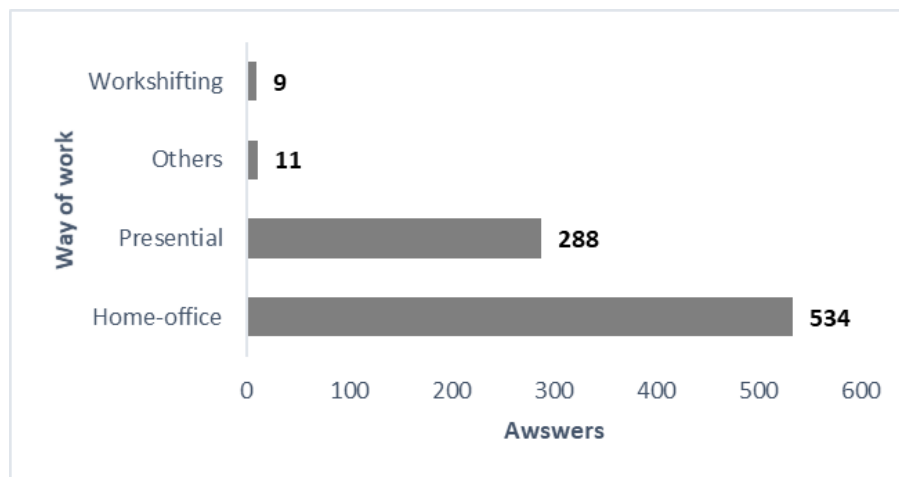


Figure 2. Frequency distribution to Region of the country



As for the work model during the pandemic, most people were in the non-face-to-face model, characterized by the home office and workshifting, corresponding to 64.49% of respondents. This gives us a parameter of association with the ability of companies to reduce the impacts of the pandemic by directing their employees to care for social distance, avoiding crowds in offices and other workspaces.

Figure 3. Frequency distribution to Working model during the pandemic



Source: the author

3.2. Productivity, activities and equipment used

As for equipment and work tools, more than 80% of the responses showed a remote work profile, with the large use of notebooks, headsets and / or microphones. This equipment provides a tool profile that enables a routine work structure with team meetings and tele-assistance.

Regarding the day-to-day work activities, the profiles showed a diversification in terms of the interviewee's perception in terms of safety and productivity. 68.29% of respondents believe that the environment they are working in is safe or very safe. This response profile is directly associated with being at home during the pandemic. As for the activities they performed during working hours, 66.67% of people have some type of planning for the day to start activities and almost 60% evaluate the degree of difficulty of each activity they will perform throughout the day.

The respondents' final perception of the productivity and performance of tasks was also an important factor, as 60.05% of the responses demonstrate that the pandemic is affecting the performance of delivering the results. Respondents also assessed the planned and executed

workload of their activities. In general, you hear an increase of 16.93% in the hours worked, when calculating the hours plus those planned.

Figure 4. Frequency distribution to Equipment used while working on the pandemic

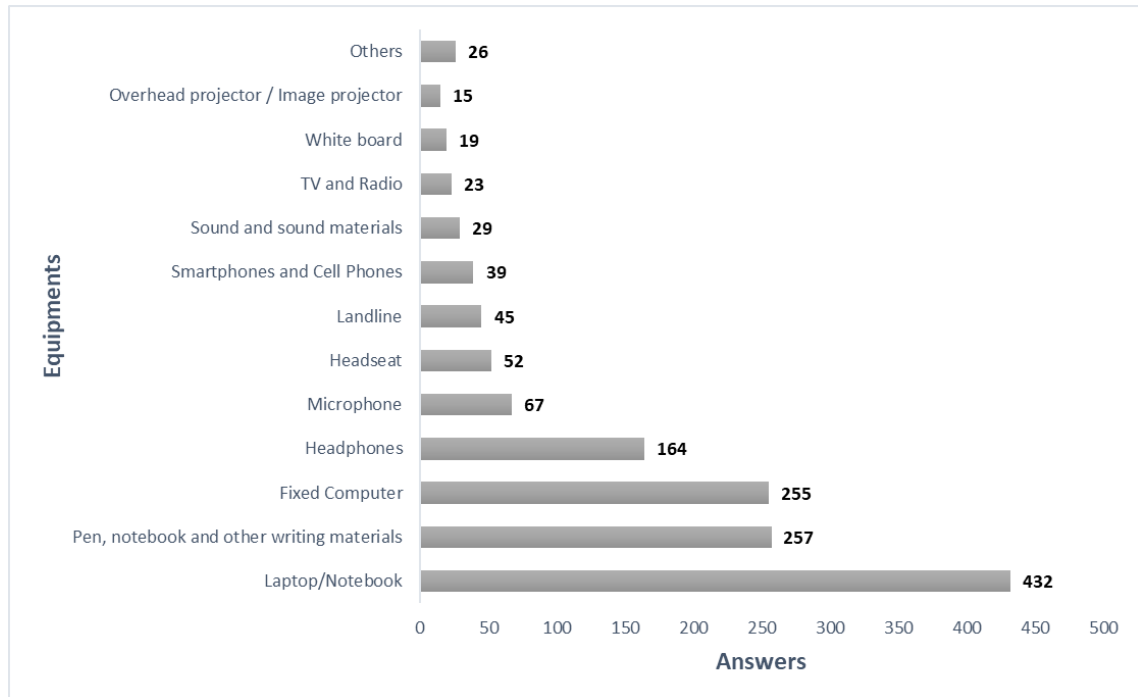


Figure 5. Frequency distribution to Safe working environment against COVID

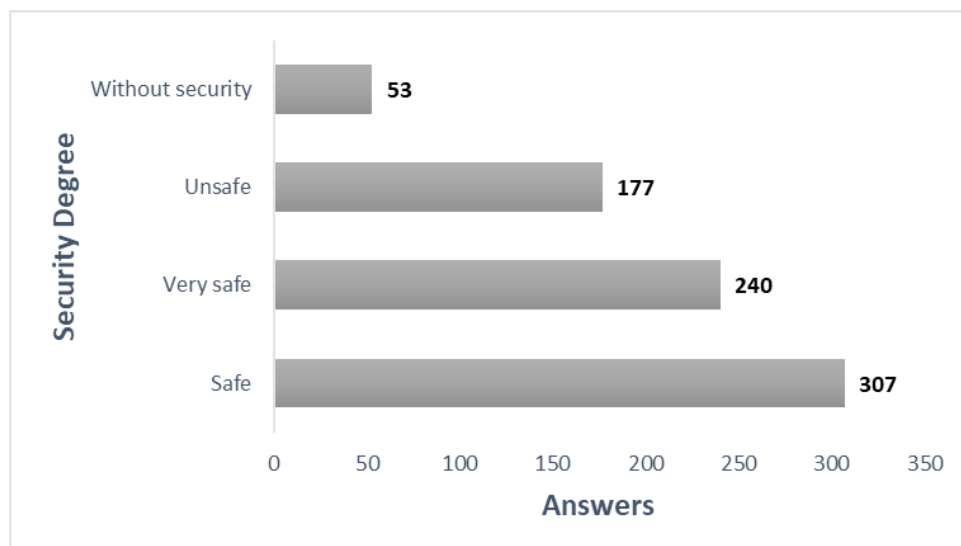


Figure 6. Frequency distribution to Daily Activity Planning

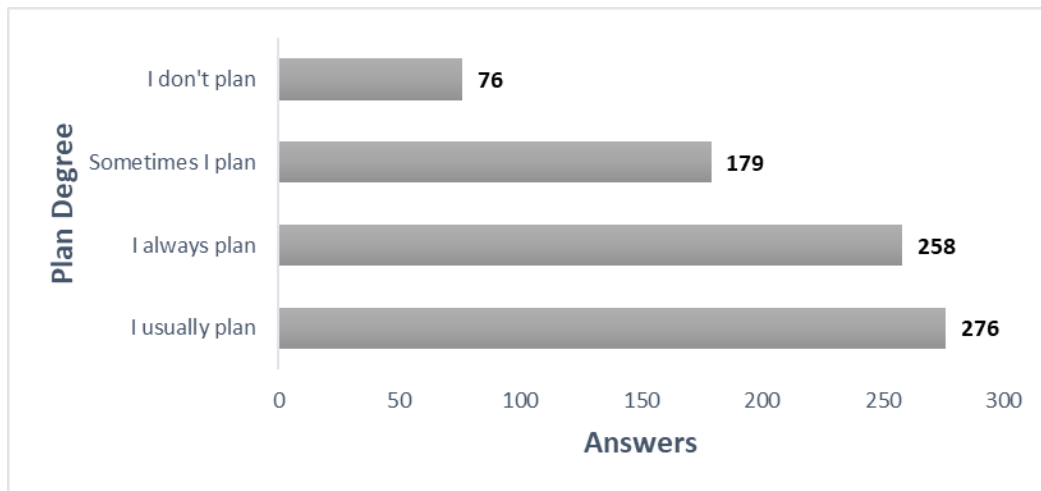
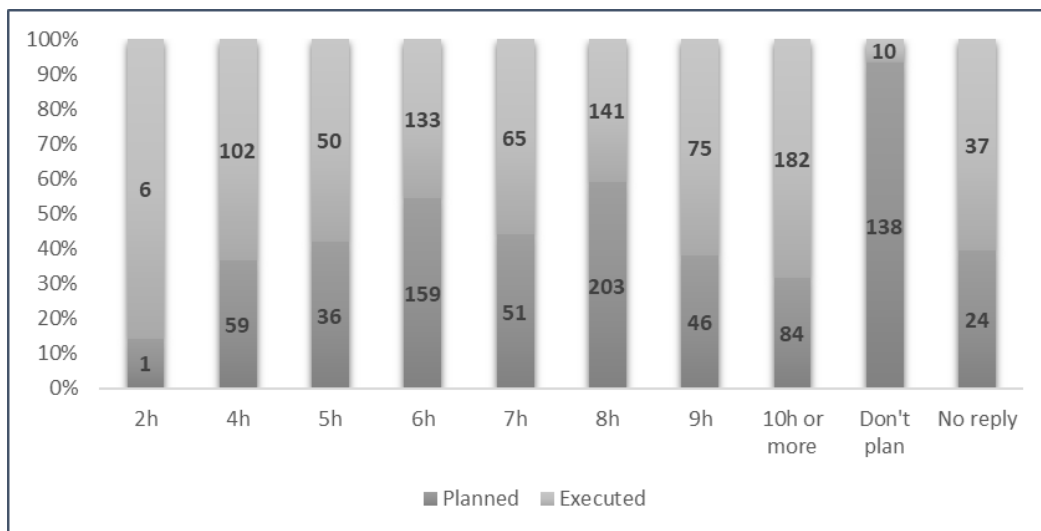


Figure 7. Frequency distribution to Hours worked plan before the pandemic *versus* hours worked during the pandemic



When comparing the residual migration of hours worked, there is an increase in the 9-, and 10-hours daily work planning modalities and a reduction in the 6-, and 8-hours work practices (more traditional hour models used by companies in Brazil). This proposes an overload of time worked when compared to what the respondent planned on the day (see Figure 8).

Regarding pressure for results and productivity, 65.17% of respondents suggested that they feel some type of pressure from companies for the activities they perform (see Figure 9).

Figure 8. Frequency distribution to Migration of residual hours worked and not worked

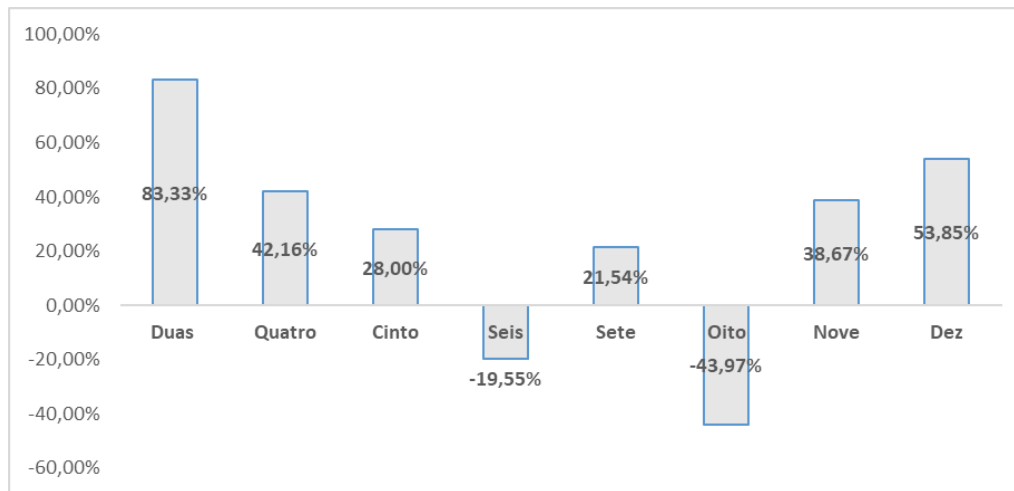
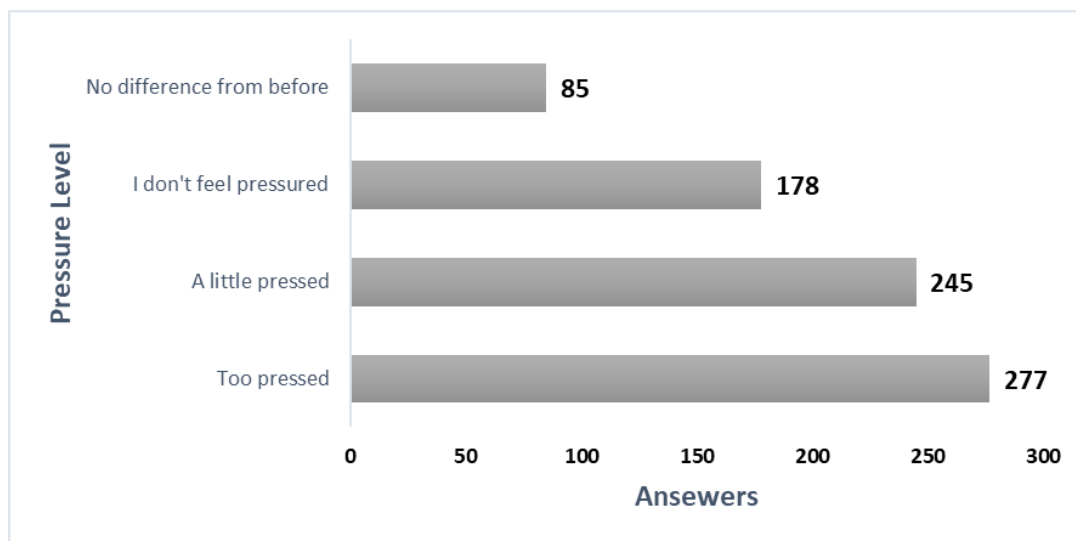


Figure 9. Frequency distribution to Migration of residual hours worked and not worked



3.3. Structure and workplace

In the analysis and perception of the worker as to the comfort and work structure they had, 63.17% answered that they found the place to exercise their activities comfortable and 63.55% found the same place to work. In this comparison, suitability and quality of the workplace are reproducing the same response pattern.

Figure 10. Comparative analysis to Adaptation of the job position to COVID 19 (absolute value)

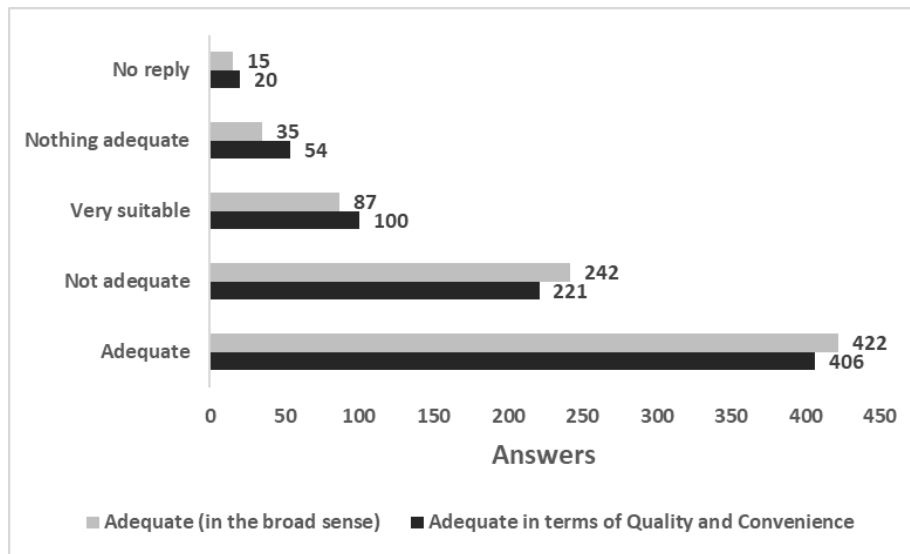
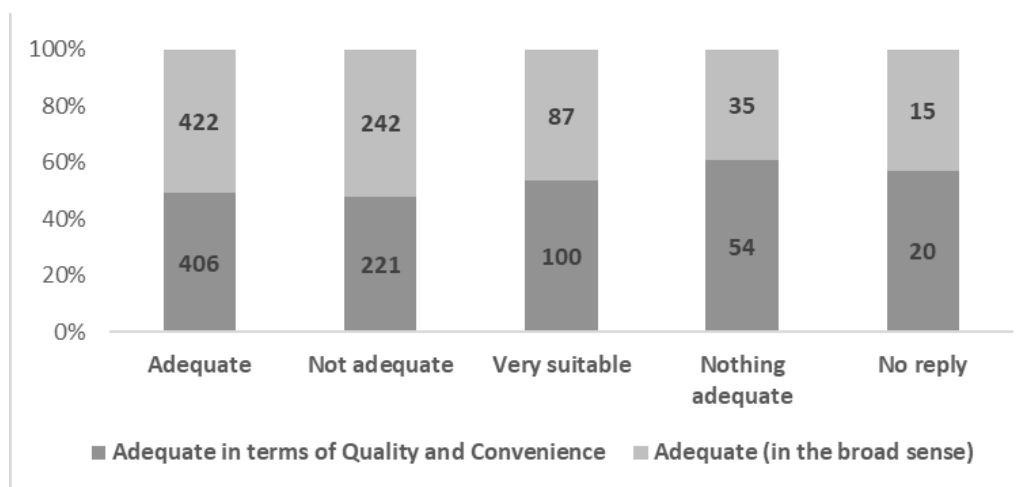


Figure 11. Comparative analysis to Adaptation of the job position to COVID 19 (absolute and % value)



Regarding the help and support that companies were giving during the pandemic, 54.31% of respondents said they were receiving some helping type and 34.46% were not receiving any help from their companies.

Figure 12. Frequency distribution to Help from companies during a pandemic period



3.4. Diseases and other problems

During the pandemic, respondents also reported onset of illness and other types of problems. Many of them had some type of illness or critical problem before the pandemic started, which could impair or reduce their performance. Before the pandemic, 26.16% had pain in the lower back (the greatest disease recorded among the responses), followed by pain in the neck (16.97%). During the pandemic, these same diseases appeared in other people, with 25.46% of problems in the lumbar and 20.66% in the cervical. The before and after model are very similar and indicate a mirror of the emergence of remote work, indicating a lot of computer work, with a sitting position and an arm extended to the mouse (these were the equipment most used by respondents).

When asked about sleep continuity and regularity, there was an increase of 39.81% in the responses to not having regular sleep, proportional to a 48.54% reduction in regular sleep.

Of the general problems that arose during the pandemic, 23.16% of respondents reported having suffered from anxiety attacks and 20.54% from insomnia. When asked if they sought specialized help for these problems, 43.47% responded that they were aware that they were in trouble but did not seek specialized help. Of the increases in consumption during the pandemic, 64.53% are related to some type of food, with almost 19% being only fast-food.

Figure 13. Frequency distribution to Diseases before the pandemic

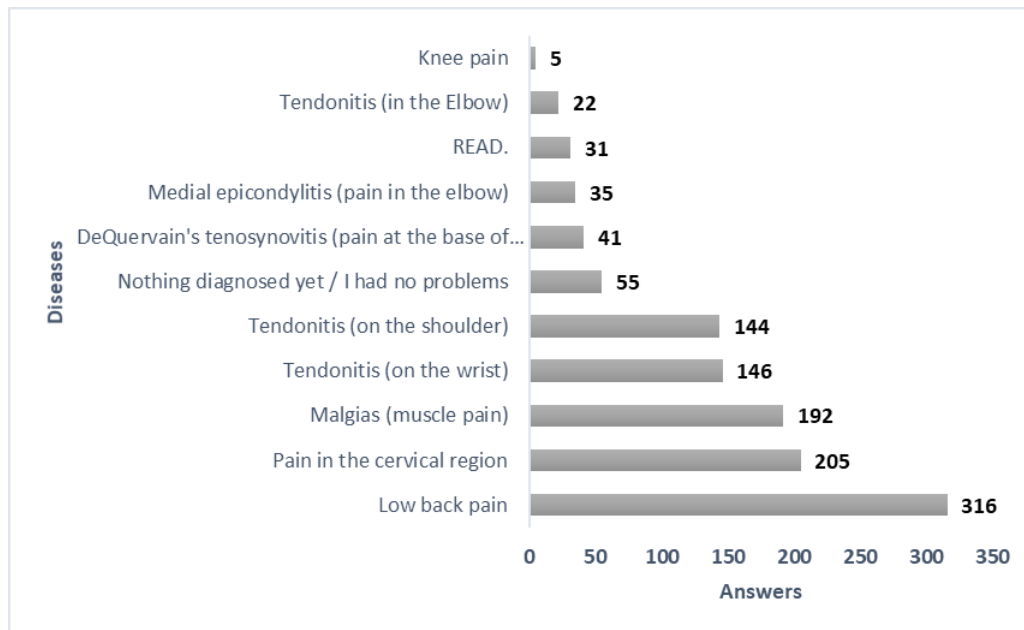


Figure 14. Frequency distribution to Diseases after the pandemic

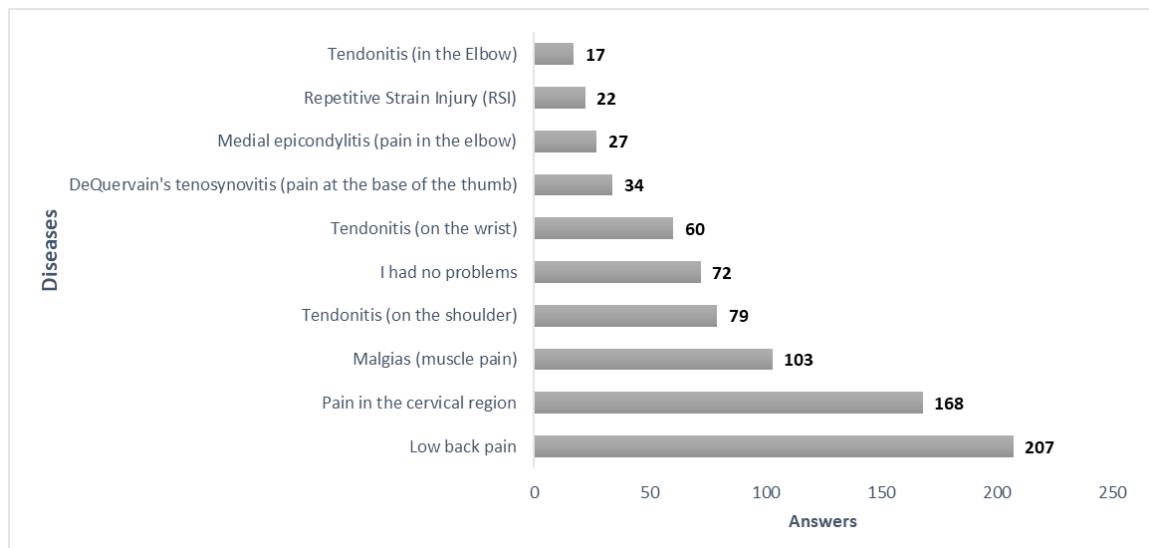
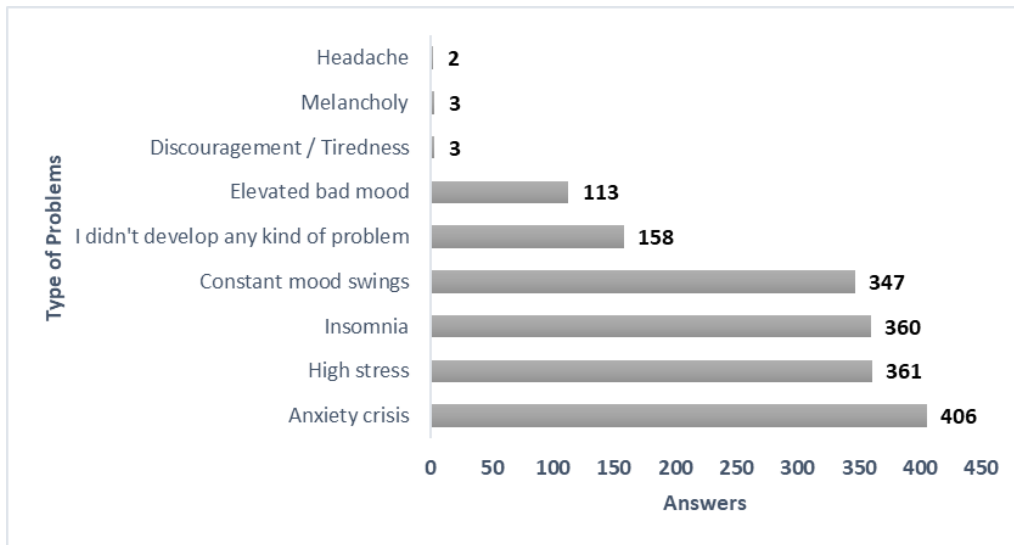


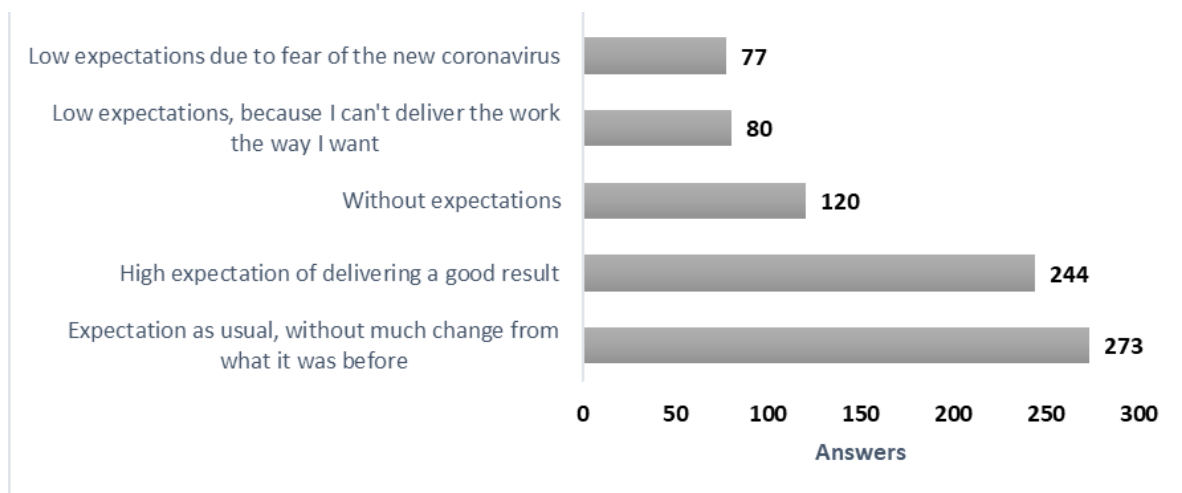
Figure 15. Frequency distribution to Problems during the pandemic



3.5. General expectations about the deliverables of the activities

Regarding the expectations of the future of work during the new corona virus pandemic, 34.08% of the respondents reported not having much difference in deliveries and 30.46% had very high expectations of delivering a good result.

Figure 16. Frequency distribution to Respondents' future expectations



4. CONCLUSIONS

Work routines were severely affected by the pandemic. In various aspects, professionals in general suffered from the drastic changes that a pandemic can bring, both in the pre-established moulds and the need to adapt to the labour market. The results show how important it is for public authorities to act on the health of the working class in general, as well as the companies that hire them, offering the necessary technical and medical support for them to adapt to the routines of social isolation (specifically for those working remotely) and follow protocols when it comes to hybrid and face-to-face work.

In this first moment of the pandemic of the studied period, the unpreparedness of the entire production and service chain for adaptations to the continuity of work during the pandemic is notorious through the study presented.

It is important that the scientific community can better understand the pandemic labour and that the cooperation of public authorities, together with private organizations, carry out continuous improvement plans to better adapt their employees to the routines of their activities, as the long-term consequences can be much larger than those currently presented.

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