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# Nursing work hours: individual needs versus working conditions

## ABSTRACT

**OBJECTIVE:** To assess factors associated with professional and total hours of work (work + home) among nursing staff.

**METHODS:** Cross-sectional study conducted in a university hospital in the city of São Paulo, southeastern Brazil, between 2004 and 2005. A total of 696 workers (nurses, nurse technicians and aids), mostly women (87.8%) working day and/or night shifts, participated in the study. A self-administered questionnaire was used to collected information on demographic characteristics, and working and life conditions. Translated and adapted into Portuguese versions of the Job Stress Scale, Effort-reward imbalance, Short-Form-Health-related quality of life and the Work Ability Index were also administered. Logistic regression models were used for data analysis.

**RESULTS:** Sole breadwinner, working night shifts and effort-reward imbalance were the variables associated with both professional (OR = 3.38, OR = 10.43, OR = 2.07, respectively) and total hours of work (OR = 1.57, OR = 3.37, OR = 2.75, respectively). There was no significant association between the variables related to hours of work and low Work Ability Index. Inadequate rest at home was statistically associated with professional (OR = 2.47) and total hours of work (OR = 1.48). Inadequate leisure time was significantly associated with professional hours of work (OR = 1.58) and barely associated with total hours of work (OR = 1.43).

**CONCLUSIONS:** The sole breadwinner, working night shifts and effort-reward imbalance are variables that need to be further investigated in studies on work hours among nursing staff. These studies should explore workers' income and the relationship between effort and reward, taking into consideration gender issues.

**DESCRIPTORS: Nurses. Nurses' Aides. Working Conditions. Job Satisfaction. Personal Satisfaction. Cross-Sectional Studies. Working time. Shift work. Night work.**

## INTRODUCTION

In the last decades, there has been a worldwide trend towards longer work hours.[13,15] It is difficult to establish a safe limit to the duration of work hours, due to the variety of conditions involved. However, studies indicate that longer work hours negatively interfere with several aspects of life in the workplace and out of it.[6,11,13,18-20]

One of these studies[6] was published by the National Occupational Research Agenda (NORA), an American group that proposed a model for long work hours based on the critical literature review and long discussion of 175 specialists

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and researchers. According to the authors, this is not a definitive model, but rather something that is aimed at enabling one to reflect and recommending future research on factors that influence work hours and their potential negative results.

The proposed model is comprised of hierarchical levels. The first level includes social, economic and individual factors that combine with each other and result in long work hours. Work schedule characteristics are grouped with these factors, whose direct effects are the reduction in the time available for other activities and the increase in exposure to demands and risks in the workplace. The following hierarchical level includes immediate or medium- and long-term negative outcomes, whose occurrence may be influenced by workers' and work characteristics. Sociodemographic variables, the demands of life out of the workplace and workers' resources are examples of such characteristics, in addition to demands, control and rewards in the work context. The following immediate outcomes stand out: reduction in sleeping time, symptoms of fatigue and stress, pain and several types of dysfunction. Medium- and long-term outcomes may occur in the context of the worker (such as early inability to work), family (such as interference with the quality of relationships and care), employer (such as costs of diseases and accidents), and community (such as accidents and mistakes in the workplace).[6]

In Brazil, it is well-known that nursing professionals have long work hours. Work shifts of 12 hours followed by 36 or 60 hours of rest[3,19,20] enable these professionals to engage in more than one productive activity. In this professional group, long work hours can lead to exhaustion and fatigue, which may affect patient care.[13,17] In addition, due to the predominance of women,[2,18] professional work is added to domestic work, resulting in the total work hours.[13,20]

Few studies[11,22] have considered the complexity of nursing work hours, guided by the variety of conditions that interfere with their determinations and outcomes, as proposed in the model developed by Caruso et al.[6] The analysis of work hours cannot be restricted to professional work; instead, it should include the work performed at home.[16,22,26,27] Thus, the present study aimed to analyze factors associated with the professional work hours and total work hours (professional work and domestic work) among nursing professionals.

## METHODS

A cross-sectional study was conducted in a university hospital of the city of São Paulo, Southeastern Brazil, between 2004 and 2005.[9,24]

All nurses, nursing technicians and nursing assistants who had worked for at least three months in this university hospital were invited to participate in the study, totaling 996 workers, after excluding those who were on sick leaves (n = 21) and maternity leaves (n = 5). A total of 696 workers (69.9% of those eligible) accepted to participate. There were no statistical differences between those who accepted to participate and others who did not in terms of sex, age and length of time working in the hospital, thus suggesting homogeneity between these groups.[9] The group of professionals studied included a high number of individuals with two jobs and/or long professional work hours.[9]

Data collection was performed by a trained technical professional with a higher education level and based on a set of self-completed questionnaires. The following aspects were considered in the present study: sociodemographic information; living and working condition aspects; and the Job Stress Scale,[1] Effort Reward Imbalance,[7] Medical Outcomes Study 36 Item Short-Form Health Survey[8] and Work Ability Index (WAI)[a] questionnaires, previously translated and adapted to the Portuguese language.

The Job Stress Scale proposes four combinations between psychological demands and job control, based on the intersection between high and low demand and high and low control. The combination posing the highest risk corresponds to high psychological demand and low job control (high strain). This scale also considers social support at work.[1]

The effort-reward imbalance[23] describes the ratio between effort scores and job rewards. Coefficients higher than "one" indicate exposure to high effort associated with low reward.[7]

The SF-36 is a general questionnaire about health-related quality of life, according to a multidimensional construct.[8] In the present study, only the question about the "general health state" dimension was used: "In general, would you say your health is excellent, very good, good, poor, or very poor?".

The WAI[a] reveals how well workers can perform their job, considering the physical and psychological job demands, in addition to these workers' health state and resources. Scores lower than 37 were categorized as an inadequate ability to work.[9]

The work hours were estimated according to information about the number of nursing jobs and working hours in each job, during one week. A cut-off point of 44 hours was used, as established by the Brazilian Constitution.[5] Work hours longer than this value are

[a] Tuomi K, Ilmarinen J, Jahkola A, Katajarine L, Tulkki A. Índice de Capacidade para o Trabalho: adaptação para o português por Fischer FM et al. São Carlos: Ed. Universidade Federal de São Carlos; 2005.

associated with complaints of lack of sufficient time for rest, leisure and domestic work,[20] indicating long professional work hours.

Domestic work hours corresponded to the total daily time spent on domestic activities in the week prior to data collection. The median point was used as cut-off point; values higher than the median indicated long domestic work hours.

The "total work hours" variable was constructed by adding the values of the "professional work hours" and "domestic work hours" variables.[22] Values higher than the median point were characterized as long total work hours (> 61h/week).

The "lack of sufficient time" variables were defined through the following questions: "Would you say that, because of your work, you don't usually have enough time to rest during the week?" and "Would you say that, because of your work, you don't usually have enough leisure time on your days off?", to which participants could respond "yes", "sometimes" and "no". The two first response options were combined to categorize workers who reported not having sufficient time.

Data treatment was based on two stages of analysis (Figure). In the first analysis, each type of work hours (professional and total) was tested in terms of their association with variables considered to be determinants of and to have an influence on long work hours, as recommended by Caruso et al.[6] In the second analysis, each type of work hours was tested in relation to the variables identified by Caruso et al[6] as outcome variables. In this way, professional and total work hours functioned as either dependent variables or exposure variables.

In the first analysis, a hierarchical logistic regression model was constructed for each dependent variable. Level 1 of the models was comprised of determinant variables (first figure), while level 2 was comprised of influencing factors (figure to the left). Variables whose statistical significance level in the Pearson's $\chi^2$ test was equal to or lower than 0.10 were included in the regressions. In the second analysis, the multiple and simple logistic regression models were constructed.

Odds ratios (OR) whose 95% confidence interval (95%CI) did not include the value "1" were considered as statistically significant in the final models. All analyses were developed with the SPSS statistical package (version 12.0).

Nursing professionals participated on a voluntary basis. This research project was approved by the *Universidade de São Paulo* School of Public Health Research Ethics Committee (Of. COEP 168/03) and by representatives of the study hospital, according to Human Research Ethics principles.

## RESULTS

The study group was mostly comprised of women, aged 40 years or less, who worked as technicians or nursing assistants. Approximately half of the professionals had children younger than 18 years and 77.7% did not have a cleaning woman. Of all professionals who worked night shifts, 50.7% had a job, 19.1% had two night jobs and 30.2% had a day job and a night job (Table 1).

The median of domestic work hours among women was 13 hours/week; among men, this median was seven hours/week. The median of professional work hours was 39 hours/week among women and 44 hours/week among men.

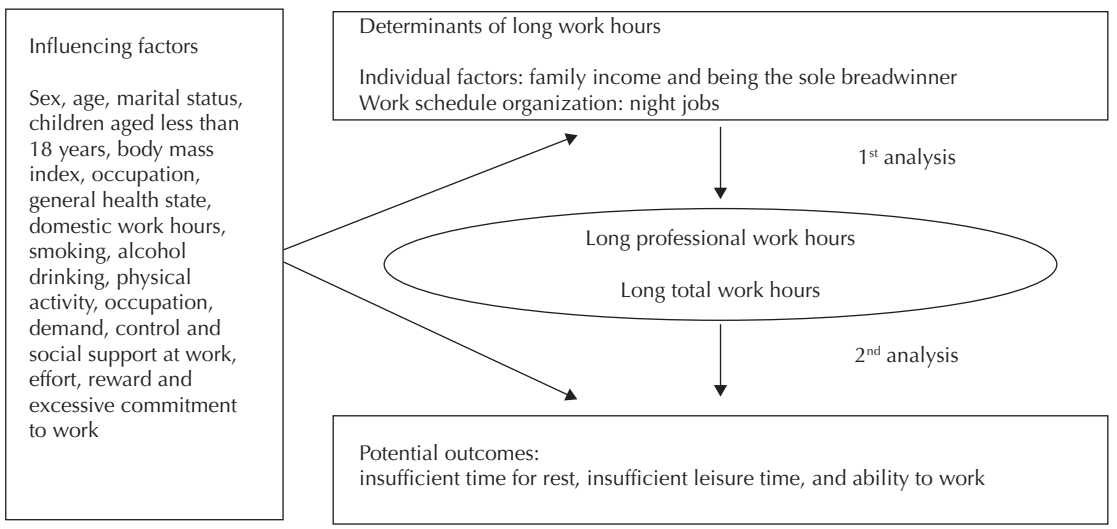


**Figure.** Variables used to observe the association with long work hours, based on the model proposed by Caruso et al.

Variables that showed a statistically significant association with the professional and total work hours in the first analysis are described in Tables 2 and 3, respectively. The only variables associated with both types of work hours were "being the sole breadwinner", "having a night job" and "effort-reward imbalance".

None of the exposure variables tested in the second analysis (Table 4) showed a statistically significant association with the low WAI. Both types of work hours (professional and total) were associated with insufficient time for rest in a statistically significant way. The same result was observed in relation to insufficient leisure time, although the statistical significance of the association showed a borderline value in this last case.

## DISCUSSION

It was possible to observe similarities and differences in the associations between the variables analyzed and the work hours, as the same set of variables was considered for both types of work hours. One similarity between these types of work hours is the independent statistical association with the fact of being the sole breadwinner, night job and effort-reward imbalance. However, the OR of the "being the sole breadwinner" and "working at night" categories were lower for the "long total work hours" outcome than "long professional work hours". The domestic work hours, which are part of the total work hours, probably functions as an important factor in the reduction in the OR. "Being the sole breadwinner" and "working at night" seem to be relevant factors for both domestic and professional work. The present study confirmed that the longer the domestic work hours, the lower the professional work hours, as reported in a previous publication.[22]

In addition, this article confirmed statistical associations between professional and total work hours (professional and domestic work hours combined) of nursing professionals and variables considered by the literature as individual determinants, influencing factors and outcome variables of such work hours.[6]

These results corroborate the model developed by Caruso et al,[6] in terms of the requirements and responsibilities of workers associated with long work hours. Among these professionals, being the sole breadwinner and, consequently, the only one meeting the family's financial requirements may translate into a double work shift. This results in excessive demands, prolonged exposures to adverse environments in one or more hospitals, and possible health problems. The statistical association between higher household income and long professional work hour may also mean greater exposure to work, as the possibility of better pay could be associated with the search for longer professional work hours,[6] although workers' *per capita* income was not analyzed. It may be more relevant to observe the primary breadwinner and workers' per capita income when assessing work hours, rather than using the household income value.

**Table 1.** Sociodemographic and occupational characteristics of nursing professionals. São Paulo, Southeastern Brazil, 2004-2005 (N = 696)

| Variable | n | % |
|---|---|---|
| Women | 611 | 87.8 |
| Aged less than 40 years | 469 | 67.4 |
| Single, separated or widowed | 390 | 56.0 |
| With children aged less than 18 years | 360 | 51.7 |
| Sole breadwinner | 382 | 54.9 |
| Nursing technicians and assistants | 540 | 77.6 |
| 12-hour night shift x 36 hours of rest | 327 | 47.0 |
| High job strain | 154 | 22.1 |
| Perception of more efforts than rewards (coefficient ≥ 1.01) | 54 | 7.8 |
| Low work ability | 159 | 22.8 |
| Insufficient time for rest | 478 | 68.7 |
| Insufficient leisure time | 452 | 64.9 |
| Long domestic work hours | 326 | 46.8 |
| Long professional work hours | 202 | 29.0 |
| Long total work hours | 331 | 47.6 |
| | Average | SD |
| Age | 34.9 | 10.5 |
| Monthly household income (R$) | 2,768.03 | 1,866.47 |
| Length of time working in the hospital (years) | 7 | 6.9 |
| Domestic work hours (hours) | 16.8 | 18.9 |
| Professional work hours (hours) | 49.7 | 16.9 |
| Total work hour (hours) | 66.4 | 24.2 |

The statistical association between night jobs and long professional work hours probably occurred because approximately 50% of night workers had at least two nursing jobs, whether during the day or at night. Having more than one job is a characteristic of hospital nursing professionals in Brazil.[19] Long professional work hours in the nursing area are associated with higher risk of occupational accidents, among other things.[17,21] As observed by Fischer et al,[9] the health and quality of life of workers who are frequently or always under physical and psychological pressure, which is the case of this population, may be affected.

A reduction in sleep time is one of the explanations for the association between night jobs and long total work hours.[4] Time that should be spent sleeping (during the day) is not usually used for rest, but rather for other

**Table 2.** Hierarchical logistic regression analysis of factors associated with long professional work hours in nursing professionals. São Paulo, Southeastern Brazil, 2004-2005. (N = 696)

| Variable/ Categories | OR | 95%CI | Adjusted OR | 95%CI |
|---|---|---|---|---|
| Level 1 | | | | |
| Household income | | | | |
| Up to R$ 2,999.99 | 1 | | 1 | |
| R$ 3,000.00 or more | 1.67 | 1.19;2.34 | 2.96 | 1.80;4.88 |
| Being the sole breadwinner | | | | |
| More than one person | 1 | | 1 | |
| Alone | 3.15 | 2.20;4.51 | 3.38 | 2.16;5.29 |
| Night job | | | | |
| No | 1 | | 1 | |
| Yes | 10.59 | 6.86;16.35 | 10.43 | 6.52;16.69 |
| Level 2 | | | | |
| Sex | | | | |
| Female | 1 | | 1 | |
| Male | 2.08 | 1.31;3.31 | 1.82 | 1.03;3.20 |
| Domestic work hours | | | | |
| Up to 12h | 1 | | 1 | |
| 13h or more | 0.50 | 0.35;0.70 | 0.47 | 0.31;0.71 |
| Occupation | | | | |
| Technicians/assistants | 1 | | 1 | |
| Nurses | 1.40 | 0.96;2.05 | 1.01 | 0.58;1.77 |
| Smoking | | | | |
| No | 1 | | 1 | |
| Ex-smoker | 1.44 | 0.91;2.28 | 1.18 | 0.67;2.05 |
| Yes | 0.70 | 0.43;1.13 | 0.73 | 0.41;1.32 |
| ERI coefficient | | | | |
| Up to 1.00 | 1 | | 1 | |
| More than or equal to 1.01 | 2.08 | 1.19;3.66 | 2.07 | 1.01;4.29 |
| Demand-control | | | | |
| Low strain | 1 | | 1 | |
| Active job | 2.00 | 1.24;3.23 | 1.59 | 0.89;2.84 |
| Passive job | 1.12 | 0.69;1.82 | 1.38 | 0.75;2.53 |
| High strain | 1.52 | 0.92;2.50 | 1.82 | 0.97;3.43 |

ERI coefficient: effort-reward imbalance

activities, whether they are domestic or professional in nature. This does not always enable workers to meet their leisure and rest requirements, as shown in the results of this study (Table 4).

The imbalance between effort and reward also functioned as a factor statistically associated with both work hours that could influence the occurrence of long work hours and their outcomes. There was a small variation in the OR of workers who reported more efforts than rewards at work, when the models of both work hours are compared. Long work hours alone characterize an increase in requirements or efforts at work, whether professional or domestic. Perception of rewards at work is a factor that has been rarely used in studies on this theme conducted in Brazil.[10,24] It is suggested that future studies should also assess the dimensions of efforts and rewards separately in their association with work hours. The present results of the relevance of the effort-reward relationship for health in this group confirm those found by Silva et al[24] and Griep et al,[10] which is apparently more important than job demand and control.

Being male was statistically associated with long work hours. Considering the fact that men also have a lower domestic work hours, this result shows women's social

**Table 3.** Hierarchical logistic regression analysis of factors associated with long total work hours among nursing professionals. São Paulo, Southeastern Brazil, 2004-2005. (N = 696)

| Variable/Categories | OR | 95%CI | ORaj | 95%CI |
|---|---|---|---|---|
| Level 1 | | | | |
| Financial responsibility | | | | |
| More than one person | 1 | | 1 | |
| Alone | 2.14 | 1.57;2.91 | 1.57 | 1.12;2.20 |
| Night job | | | | |
| No | 1 | | 1 | |
| Yes | 3.4 | 2.48;4.65 | 3.37 | 2.42;4.70 |
| Level 2 | | | | |
| Age | | | | |
| More than or equal to 40 years | 1 | | 1 | |
| Up to 40 years | 0.54 | 0.39;0.75 | 0.59 | 0.40;0.87 |
| With children aged less than | | | | |
| No | 1 | | 1 | |
| Yes | 1.6 | 1.18;2.17 | 1.31 | 0.92;1.86 |
| Smoking | | | | |
| No | 1 | | 1 | |
| Ex-smoker | 1.59 | 1.02;2.48 | 1.51 | 0.93;2.44 |
| Yes | 0.76 | 0.50;1.41 | 0.82 | 0.53;1.28 |
| ERI coefficient | | | | |
| More than or | 1 | | 1 | |
| Equal to 1.01 | 2.88 | 1.55;5.34 | 2.75 | 1.43;5.29 |

ERI coefficient: effort-reward imbalance

role as those responsible for the domestic activities.[22] Several authors suggest a compensatory mechanism in women, through which their responsibility for unpaid domestic work frequently occurs to the detriment of their dedication to other activities,[11,14,20,22,26,b] such as the investment in their professional careers. When the prevalence of women in this population is considered, having children younger than 18 years was expected to be significantly associated with total work hours, which did not occur. Child care in this group may not mean longer work hours, if this was not perceived as "workload", according to Portela.[b] Children could be a type of reward and thus counter-balance the demands originated from professional work.[14,26,b]

Being aged more than 40 years was a factor that was statistically associated with long professional work hours. This result suggests a possible overlapping of risks, because the "age" variable is collinear with the "length of time working in nursing, in shifts and in the study hospital" variables. Consequently, this result warns about the fact that workers with all these characteristics are still exposed to long total work hours. Grosch et al[11] also identified a significant number of middle-aged workers performing long work hours, contrary to what was expected.

With regard to the associations between work hours and outcome variables, the results related to ability to work complement a discussion raised by Fischer et al.[9] The current results did not show an association between long total work hours and inadequate ability to work, as assumed in the study conducted by Rotemberg et al,[22] who observed such association among women exclusively. Having more than one job was a possible explanation, as neither the domestic work hours nor the professional work hours alone were associated with the WAI.[22] However, there are important differences between both studies with regard to the WAI and work hours. In the current study, in which women comprise 90% of the group, the percentage of workers with low WAI (22.8%) was much lower than what was observed by Rotemberg et al[22] among women (40.5%). The domestic work hours among men was also different in both populations, being higher in the present study. In the population of the present study, the mean domestic workload of men and women differed in 1.2 hours/week, which could explain a certain similarity between men

[b] Portela LF. Morbidade referida e gerenciamento de tempo entre profissionais da enfermagem: relações com o trabalho noturno, as longas jornadas e o trabalho doméstico [dissertação de mestrado]. Rio de Janeiro: Fundação Oswaldo Cruz, Escola Nacional de Saúde Pública; 2003.

**Table 4.** Logistic regression analysis between long work hours and outcome variables among nursing professionals. São Paulo, Southeastern Brazil, 2004-2005. (N = 696)

| Models | Exposure factors | Outcome variables | | |
|---|---|---|---|---|
| | | Low work ability[a] | Insufficient time for rest on weekdays[b] | Insufficient leisure time on days off[c] |
| | | OR (95%CI) | OR (95%CI) | OR (95%CI) |
| 1 | Professional work hours | 0.88 (0.59;1.31) | 2.47 (1.66;3.68)* | 1.66 (1.16;2.37)* |
| 2 | Professional work hours + moderators | 0.87 (0.58;1.31) | 2.47 (1.69;3.72)* | 1.58 (1.10;2.29)* |
| 3 | Total work hours | 0.95 (0.66;1.36) | 1.45 (1.04;2.00)* | 1.35 (0.98;1.86) |
| 4 | Total work hours + moderators | 0.89 (0.61;1.29) | 1.48 (1.05;2.09)* | 1.43 (1.01;2.02)* |

[a] Moderators associated with the Low Work Ability: children aged less than 18 years, body mass index, general health state and commitment to work.
[b] Moderators associated with lack of time for rest: age, body mass index, demand and control, social support and commitment to work.
[c] Moderators associated with lack of leisure time: age, occupation, effort-reward imbalance, social support and commitment to work.
* significant associations ($p < 0.05$)

and women in terms of the contribution of domestic work to the total work hours (22% and 26%, respectively). Such differences between both populations may explain the distinct results found in both studies.

There was a significant association between long professional work hours and reporting lack of time for rest and leisure. The work schedule organization in the study hospital contributed to this association, as these workers only had three consecutive days of rest per month, including Saturday and Sunday. These periods were probably the only ones when it was possible to organize leisure activities with the family, provided that other professional or domestic activities did not use family bonding time. Night shifts and the resulting reduction in sleep time during the day could also have contributed to the insufficient time for rest on weekdays. This is a plausible question for this population, as workers with long work hours usually report a greater need for recovery or rest after work.[12]

The role of "influencing" variables in the second analysis was significant for "insufficient leisure time", emphasizing the fact of this being indirectly associated with total work hours.[25] That is the reason for their importance, putting an emphasis on the model proposed by Caruso et al.[6] In nursing, the health problems coming from these immediate outcomes include musculoskeletal and psychological disorders, exhaustion and fatigue, sleep deprivation and insomnia, and complaints about lack of family bonding time.[6,9,22]

The present study corroborates that conducted by Portela et al[20] as it concludes that excessive dedication to professional activities negatively interferes with the time available for rest and leisure and, consequently, for the family. In addition, long professional work hours can also affect time for rest and leisure among men. In this case, the majority of them have a partner (54.1%) and this could mean longer professional work hours, depending on the division of tasks and responsibilities established by the family. Moreover, by considering the fact that women had a mean of domestic work hours statistically higher than that of men and that the majority of these women could not have the help of a cleaning woman, it could be assumed that there is a relationship between men's long professional work hours and women's long domestic work hours.

Long work hours may vary in intensity, pauses and frequency of repetition. The poorer the working conditions in terms of psychosocial aspects and workload, the more harmful the work hours tends to be. The importance of a set of studies on this theme is emphasized by the inexistence of a limit to the length of work hours which is safe for health.[6] The present study considered the professional work hours *per se* and that combined with domestic work. As this study had a cross-sectional design, it was not aimed at establishing a causal relation among variables. The importance of being the sole breadwinner, having a night job and the imbalance between effort and reward should be emphasized in the long work hours of this population. One of the limitations of the present study is that data on all socioeconomic aspects were not collected, as foreseen by the model developed by Caruso et al.[6] We suggest that future studies on this theme use the above mentioned factors, that gender relations and the per capita income of each worker be approached, and that the relationship between efforts and rewards be assessed separately.

## REFERENCES


1. Alves MGM, Chor D, Faerstein E, Lopes CS, Werneck GL. Versão resumida da "job stress scale": adaptação para o português. *Rev Saude Publica*. 2004;38(2):164-71. DOI:10.1590/S0034-89102004000200003

2. Barreira IA. A reconfiguração da prática da enfermagem brasileira em meados do século 20. *Texto Contexto Enferm*. 2005;14(4):480-7. DOI:10.1590/S0104-07072005000400002

3. Borges FNS, Fischer FM. Twelve-hour night shifts of healthcare workers: a risk to the patients? *Chronobiol Int*. 2003;20(2):351-60. DOI:10.1081/CBI-120019341

4. Borges FNS, Fischer FM, Rotenberg L, Soares NS, Fonseca MB, Smolensky MH, et al. Effects of naps at work on the sleepiness of 12-hour night shift nursing personnel. *Sleep Sci*. 2009;2(1):24-9.

5. Brasil. Constituição Federal de 1988. Rio de Janeiro: Livraria Freitas Bastos; 1998. Dos direitos e garantias fundamentais, dos direitos sociais; p.13, artigo 7°, alínea XIII.

6. Caruso CC, Bushnell T, Eggerth D, Heitmann A, Kojola B, Newman K, et al. Long working hours, safety, and health: toward a National Research Agenda. *Am J Ind Med*. 2006;49(11):930-42. DOI:10.1002/ajim.20373

7. Chor D, Werneck GL, Faerstein E, Alves MGM, Rotenberg L. The Brazilian version of the effort-reward imbalance questionnaire to assess job stress. *Cad Saude Publica*. 2008;24(1):219-24. DOI:10.1590/S0102-311X2008000100021

8. Ciconelli RM, Ferraz MB, Santos W, Meinão I, Quaresma MR. Tradução para a língua portuguesa e validação do questionário genérico de avaliação de qualidade de vida SF-36 (Brasil SF-36). *Rev Bras Reumatol*. 1999;39(3):143-50.

9. Fischer FM, Borges FNS, Rotenberg L, Latorre MRDO, Soares NS, Santa Rosa, PL, et al. Work ability of health care shiftworkers: what matters? *Chronobiol Int*. 2006;23(6):1165-79. DOI:10.1080/07420520601065083

10. Griep RH, Rotenberg L, Landsbergis P, Vasconcellos-Silva PR. Uso combinado de modelos de estresse no trabalho e a saúde auto-referida na enfermagem. *Rev Saude Publica*. 2011;45(1):45-52. DOI:10.1590/S0034-89102011000100017

11. Grosch JW, Caruso CC, Rosa RR, Sauter SL. Long hours of work in the U.S.: associations with demographic and organizational characteristics, psychosocial working conditions, and health. *Am J Ind Med*. 2006;49(11):943-52. DOI:10.1002/ajim.20388

12. Jansen NWH, Kant I, van Amelsvoort LGPM, Nijhuist FJN, van den Brandt PA. Need for recovery from work: evaluating short-term effects of working hours, patterns and schedules. *Ergonomics*. 2003;46(7):664-80. DOI:10.1080/0014013031000085662

13. Johnson JV, Lipscomb J. Long working hours, occupational health and the changing nature of work organization. *Am J Ind Health*. 2006;49(11):921-29. DOI:10.1002/ajim.20383

14. Krantz G, Berntsson L, Lundberg U. Total workload, work stress and perceived symptoms in Swedish male and female white-collar employees. *Eur J Public Health*. 2005;15(2):209-14. DOI:10.1093/eurpub/cki079

15. Kuhn P, Lozano F. The expanding workweek? Understanding trends in long work hours among U.S. men, 1979-2005. *J Labor Econ*. 2008;26(2):311-43. DOI:10.1086/533618

16. Lennon MC, Rosenfield S. Women and mental health: the interaction of job and family conditions. *J Healh Soc Behav*. 1992;33(4):316-27.

17. Lundstrom T, Pugliese G, Bartley J, Cox J, Guither C. Organizational and environmental factors that affect worker health and safety and patient outcomes. *Am J Infect Control*. 2002;30(2):93-106. DOI:10.1067/mic.2002.119820

18. Poissonnet CM, Veron M. Health effects of work schedules in healthcare professions. *J Clinical Nurs*. 2000;9(1):13-23. DOI:10.1046/j.1365-2702.2000.00321.x

19. Portela LF, Rotenberg L, Waissmann W. Self-reported health and sleep complaints among personnel working under 12 h night and day shifts. *Chronobiol Int*. 2004;21(6):859-70. DOI:10.1081/LCBI-200038513 0742-0528

20. Portela LF, Rotenberg L, Waissmann W. Health, sleep and lack of time: relations to domestic and paid work in nurses. *Rev Saude Publica*. 2005;39(5):802-8. DOI:10.1590/S0034-89102005000500016

21. Rogers AE, Hwang WT, Scott LD, Alken LH, Dinges DF. The working hours of hospital staff nurses and patient safety. *Health Aff (Millwood)*. 2004;23(4):202-12. DOI:10.1377/hlthaff.23.4.202

22. Rotenberg L, Portela LF, Banks B, Griep RH, Fischer FM, Landsbergis P. A gender approach to work ability and its relationship to professional and domestic work hours among nursing personnel. *Appl Ergon*. 2008;39(5):646-52. DOI:10.1016/j.apergo.2008.02.013

23. Siegrist J. Adverse health effects of high-effort/low-reward conditions. *J Occup Health Psychol*. 1996;1(1):27-41. DOI:10.1037/1076-8998.1.1.27

24. Silva AA, Souza JMP, Borges FNS, Fischer FM. Health-related quality of life and working conditions among nursing providers. *Rev Saude Publica*. 2010;44(4):718-25. DOI:10.1590/S0034-89102010000400016

25. Tucker P, Rutherford C. Moderators of the relationship between long work hours and health. *J Occup Health Psychol*. 2005;10(4):465-76. DOI:10.1037/1076-8998.10.4.

26. Walters V, Lenton R, French S, Eyles J, Mayr J, Newbold B. Paid work, unpaid work and social support: a study of the health of male and female nurses. *Soc Sci Med*. 1996;43(11):1627-36. DOI:10.1016/S0277-9536(96)00067-6

27. Winwood PC, Winefield AH, Lushington K. Work-related fatigue and recovery: the contribution of age, domestic responsabilities and shiftwork. *J Adv Nurs*. 2006;56(4):438-49. DOI:10.1111/j.1365-2648.2006.04011.x

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