

# Analysis of physicians work ability, in the city of Maringá, Brazil

Análise da capacidade dos médicos para o trabalho, na cidade de Maringá

Mariana Evangelista Gracino<sup>1</sup> , Juliana dos Santos Tortajada<sup>1</sup> , Marina Braga de-Castro-Alves<sup>1</sup> , Stéphanie Freire Garcia<sup>1</sup> , Mirian Ueda Yamaguchi<sup>2</sup> , Ely Mitie Massuda<sup>2</sup> 

**ABSTRACT | Background:** Occupational stress might impair the work ability of physicians, leading to medical errors and illness. **Objectives:** To describe the sociodemographic and occupational profile of physicians, calculate the work ability index (WAI) and correlate it to sociodemographic factors, occupational characteristics and lifestyle. **Method:** Cross-sectional study conducted with a random sample of 408 physicians from Maringá, Paraná, Brazil, stratified per sex. We administered a self-report questionnaire with the following four sections: sociodemographic profile, occupational characteristics, lifestyle, and work ability. **Results:** Most participants were male (61.27%), young (20 to 40 years old—57.35%) and married (61.76%). While participants had usually completed a medical residency program (50.74%) most had worked less than 10 years in the profession (47.06%). About 44.61% of the sample worked 50 to 120 hours / week, 41.18% had formal employment relationship registered in their work card, and 53.43% slept less than six hours/day. The mean WAI was 44, which characterizes excellent work ability. Reduced WAI was associated with older age, longer length in the profession, smoking, sedentary lifestyle, and poorer mental resources to cope with the job demands. Only 1.72% of the participants stated that, based on their current state of health, continuing in the job in two years' time would be unlikely. **Conclusion:** Their excellent work ability notwithstanding, the occupational characteristics and lifestyle of physicians call for interventions to prevent impairments of their professionals performance.

**Keywords |** work environment; work capacity evaluation; working conditions; life style; health profile.

**RESUMO | Introdução:** O estresse ocupacional dos médicos pode prejudicar a sua capacidade de trabalho e culminar em erros médicos, assim como no adoecimento desses profissionais. **Objetivos:** Apresentar o perfil sociodemográfico e de trabalho de médicos e analisar o índice de capacidade para o trabalho (ICT) desses profissionais, correlacionando-o aos fatores sociodemográficos, às características do trabalho e ao estilo de vida. **Método:** Estudo transversal em uma amostra aleatória composta de 408 médicos do município de Maringá, Paraná, estratificada por sexo. O questionário autoaplicado é composto por quatro partes: perfil sociodemográfico, características do trabalho, estilo de vida e capacidade para o trabalho. **Resultados:** A maioria dos participantes é do sexo masculino (61,27%), jovem (57,35% entre 20 a 40 anos), casada (61,76%) e que, em geral, concluiu residência médica (50,74%), porém está nos primeiros 10 anos da profissão (47,06%). Em relação à carga horária de trabalho dos participantes, 44,61% trabalham de 50 a 120 horas semanais, 41,18% têm registro em carteira de trabalho e 53,43% dos entrevistados dormem menos de 6 horas por dia. A média do ICT foi 44 pontos, caracterizando ótima capacidade de trabalho. A redução da pontuação do ICT foi proporcional à idade mais elevada, aos anos de trabalho, ao tabagismo, ao sedentarismo e à redução de recursos mentais para enfrentamento. Apenas 1,72% relatou que, considerando sua saúde, era improvável exercer seu trabalho atual daqui a 2 anos. **Conclusão:** Apesar da alta capacidade de trabalho, as características relacionadas ao trabalho e ao estilo de vida dos médicos necessitam intervenções para prevenir prejuízo no desempenho desses profissionais.

**Palavras-chave |** ambiente de trabalho; avaliação da capacidade de trabalho; condições de trabalho; estilo de vida; perfil epidemiológico.

<sup>1</sup>Centro Universitário de Maringá (UniCesumar) - Maringá (PR), Brazil.

<sup>2</sup>Graduate Program in Health Promotion, UniCesumar - Maringá (PR), Brazil.

DOI: 10.5327/Z1679443520180296

## INTRODUCTION

Physicians are often exposed to exhausting working conditions which might interfere with their work ability. Such harmful exposure is due to lack of ideal working conditions, too much time devoted to the profession, lack of professional stability, sleep deprivation, night shifts, and responsibility toward patients, who transfer high emotional loads to them<sup>1-4</sup>.

Continuous occupational stress might impair the patient–doctor relationship and cause medical errors, medical absenteeism due to illness, and lack of motivation<sup>5,6</sup>. Illness among doctors might pass unnoticed, often manifests as psychiatric disorders, and there is a strong association between work overload and exposure to patients' pain, death and suffering<sup>7,8</sup>. Illness might also have physical manifestations, mainly involving the musculoskeletal system as a function of long working hours under unfavorable ergonomic conditions. The unhealthy and hazardous aspects of medical work act synergically to cause professional exhaustion<sup>2,9</sup>.

Lack of the support needed to develop strategies to cope with professional adversities interferes with the health and work of physicians<sup>10</sup>. In addition, few physicians pay attention to protective factors against occupational stress, such as academic practice, leisure and physical activities<sup>2</sup>. Such neglect might account for the high rate of suicide among physicians, which is five times higher than that of the overall population<sup>9</sup>.

Given the scarcity of studies on these aspects among physicians, the aims of the present study were to investigate the sociodemographic and occupational profile of physicians, calculate the Work Ability Index (WAI) for this population, and correlate it to sociodemographic factors, occupational characteristics, and lifestyle. WAI represents the self-perception of workers relative to their health, physical and mental capacity, and ability to satisfactorily perform their job<sup>11,12</sup>.

## METHOD

The present cross-sectional study was based on a self-report questionnaire. We located 1,993 physicians in Maringa, Parana, Brazil, accredited by the Regional Medical Council of Parana (Conselho Regional de

Medicina do Paraná — CRM-PR) which number was used to calculate the sample size<sup>13,14</sup>. Calculation was performed with the R software environment for statistical computing<sup>15</sup>, with 95% of confidence, margin of error of 5%, and correction for finite populations. Sex was considered as stratification factor for the proportional random sample. As a result, the calculated sample size was of 408 participants, being 158 female (38.73%) and 250 male (61.27%) thus representative of the target population, in which men predominate.

Data collection was performed from October 2016 through April 2017. Based on the names of physicians registered in CRM-PR Portal, participants were selected by means of the lottery method. A structured questionnaire was administered with the following four sections: sociodemographic profile; occupational characteristics; lifestyle aspects; and an instrument to calculate WAI based on the participants' self-perceived, and strategies to cope with job demands. WAI is a tool which evidences risks to the health of workers derived from imbalance between their state of health, personal resources and job demands<sup>11</sup>. The internal consistency of the questionnaire was investigated based on test–retest reliability, and its internal validity on the correlation between WAI subjective results and clinical evaluation of state of health and functional capacity<sup>16</sup>.

WAI was developed out of on studies conducted in Finland from 1981 to 1992, and was translated and adapted for use in Brazil in the end of the 1990s<sup>12</sup>. It comprises 10 questions distributed across seven domains; the total score ranges from 7 to 49, higher scores indicate better work ability. Scores are categorized as follows: 7 to 27, poor work ability; 28 to 36, moderate; 37 to 43 good; and 44 to 49 excellent. The data were subjected to descriptive analysis to obtain frequency plots and tables. Then we fit a regression model to analyze the relationship between and influence of sociodemographic variables, occupational characteristics and lifestyle on WAI. Since on residuals analysis the assumptions to ensure the validity of the multiple linear regression model were not met, the Gumbel distribution was selected<sup>17</sup>.

The influence of each variable on the regression model was analyzed by means the likelihood ratio (LR) test, which was successively performed following the inclusion of each independent variable. Goodness-of-fit was assessed based

on residuals analysis; fit with the Gumbel distribution proved to be more adequate than that with the normal distribution<sup>18</sup>. The significance of each regression coefficient obtained was analyzed by means of the T-Student test value obtained by fitting the proposed model. Since LR assesses the contribution to goodness-of-fit, its values might differ from those of Student's t-test in some cases, as the latter assesses the significance of model parameters and corresponds to the effects of each level / unit of variables on the mean WAI. Association involving occupational variables was analyzed with Sheskin's  $\chi^2$  test<sup>19</sup>. All the analyses were performed with R software environment for statistical computing (R Development Core Team)<sup>15</sup> version 3.3.1; the Gumbel regression model was fit with the GAMLSS package.

All the participants were requested to sign an informed consent form in compliance with the National Health Council Resolution no. 466 / 2012. The study was approved by the research ethics committee of University Center of Maringá (Centro Universitário de Maringá–UniCesumar) ruling no. 1,615,193.

## RESULTS

### SOCIODEMOGRAPHIC PROFILE

Most participants were male (61.27%). About 57.35% of the sample were 20 to 40 years old, 35.05% 41 to 60, and 7.60% above 71; the average age of the sample was 41 years old. About 61.76% of the participants reported to be married, 23.28% single, 7.60% divorced, 6.86% to live with a partner, and 0.49% widowed. Most participants (55.39%) reported to have children.

About 50.74% of the sample had completed a medical residency program, 13.24% a specialization course, 7.84% a master and 7.11% a doctorate program; 14.95% had completed graduate education (master and doctoral degrees).

### PHYSICIANS DENSITY

According to the Brazilian Institute of Geography and Statistics (Instituto Brasileiro de Geografia e Estatística–IBGE) Maringá's population was 403,063 inhabitants in 2016<sup>20</sup>. The number of doctors registered in Maringá that same year was 1,993, corresponding to 4.94 physicians / 1,000 inhabitants.

### OCCUPATIONAL CHARACTERISTICS

About 47.06% of the participants had worked as physician for less than 10 years, 27.21% for 11 to 20 years, and 25.74% for more than 20 years. About 50.98% of the sample worked 20 to 50 hours / week, 44.61% 51 to 120 hours / week, and only 4.41% less than 20 hours / week. Only 0.74% of the participants worked night shifts, 49.51% worked alternate shifts. There was association between years in the job and weekly working hours: physicians in the early stage of their career worked 59.4 hours / week, on average, while the ones in mid- and end of career stages 48.8 and 47.2 hours / week, on average, respectively.

About 56.13% of the participants had employment relationship with (public or private) health institutions; the remainder of the sample were self-employed. About 19.8% of the participants were outsourced, while 41.18% had their job registered in their work card. About 13.97% of the physicians had a health management position, and 49.51% university positions.

Among the participants whose job was not registered in their work card (58.82%) one third (33%) had some informal employment relationship. Among the ones with formal employment relationship, 16.42% worked at public health basic units, 11.27% at public emergency services, 28.43% at hospitals, 8.09% at specialty outpatient clinics, 2.94% at medical legal departments, and 5.88% at other institutions. It should be noticed that some participants had formal employment relationship with more than one institution, and thus there is data overlap.

Analysis of correlation of the considered occupational characteristics showed that having a formal employment relationship with some institution was more frequent among the outsourced (70%) compared to the non-outsourced participants (53%). Outsourced employees represented 29% of the professionals with jobs registered in the work card, and 14% of the professionals with non-registered jobs. About 19% of the participants with university positions also performed managerial work, versus 9% of the ones without an academic career.

### LIFESTYLE

Sleep deprivation was reported by more than half of the sample (53.43%), less than 6 hours / day, on average. About 60.54% of the participants reported to perform physical activity and 90.93% leisure activities. Only 10.54% of the interviewees were smokers.

## WORK ABILITY INDEX

### Domain and total scores

The overall score on item current work ability compared to the lifetime best was high (65% of the participants attributed scores 9 or 10—being 10 the highest possible score) as shown in Table 1.

Current work ability in relation to job demands was rated very good by 47.30% of the participants, and poor by 1.96%. About 56.37% of the sample rated their mental resources very good, and none poor or very poor. While 56.37% of the participants did not report any accident-related injury or disease diagnosed by physician, 9.81% reported three or more current diseases (Table 1).

As Table 1 shows, 6.87% of the participants stated they often or sometimes need to reduce the pace of work or change their work methods due to injury or disease. About 65.44% of the sample reported not to have had missed one single work day due to sick leave in the past 12 months, while 28.68% reported to have had missed up to nine days.

About 1.72% of the participants stated that based on their current state of health they would probably be unable to perform their work two years later, while 88.73% considered continuity in the job likely. In regard to domain mental resources, 82.60% of the sample reported to enjoy their daily tasks, 90.93% to feel active and alert, and 83.5% to feel full of hope for the future (Table 1).

Figure 1 depicts the distribution of the WAI total score, which varied from 27.5 and 49, mean 44. No participant was categorized as with poor work ability, 5.88% were categorized as with moderate, 26.9% with good and most (63.97%) with excellent work ability.

As Figure 1 shows, standard deviation was 4, and the corresponding coefficient of variation 9%, which denotes low dispersion and skew to the left (or negative skewness). The skewness coefficient was -1.27, due to greater concentration of the WAI values above the mean.

Upon standardizing the scores on each WAI item on a scale ranging from 0 to 1 (Figure 2) the lowest mean score corresponded to item “number of current diseases diagnosed by a physician.” The reason is that the participants with the highest number of current diseases obtained lower scores on WAI. Also, the mean standardized score on item “mental resources” was lower, due to reduced perception

of enjoying daily tasks, feeling active and alert, and full of hope for the future. In turn, items “estimated work impairment due to disease” and “own prognosis of work ability two years from now” received the highest scores, thus corroborating the overall good work ability of the analyzed population.

### ASSOCIATION OF WAI WITH SOCIODEMOGRAPHIC PROFILE, OCCUPATIONAL CHARACTERISTICS AND LIFESTYLE

Variables marked with the hash symbol (#) in Table 2 were the ones with significant influence on WAI. The mean total score on WAI tended to be lower among the widowed compared to the married participants by 5.19 points. WAI was higher among the participants with a PhD compared to all others, being -1.72 points lower for the ones having attended undergraduate education only.

WAI was inversely correlated to age range and years in the job; score was 42.16 for the participants above 61 years old, and 42.12 for the ones having worked more than 30 years. The WAI score decreased 0.12 points per each year of work in the profession. WAI was poorer among smokers and participants with sedentary lifestyle, the mean scores being 42.62 and 43.31, respectively. Contrariwise, the score of the participants who performed physical activity was higher by 1.05 points (Table 2).

On the LR test, inclusion of the variables marked with an asterisk (\*) in Table 2 significantly improved the model goodness-of-fit, and were determinant to explain WAI variability. Although no significant difference was found on the mean WAI between physicians with basic specialties and the ones requiring pre-entry training, inclusion of this variable increased the explanatory power of WAI by comparison to the null model—without any independent variable. The same was the case of variables age, having children, years in the job, outsourced job, physical activity, and smoking.

## DISCUSSION

### SOCIODEMOGRAPHIC PROFILE

The predominance of men in the analyzed sample reflects the current situation in Brazil, where 56.9% of workers are

**Table 1.** Distribution of the frequency of the participants' responses to Work Ability Index items, Maringa, 2017 (n=408).

Item	Response	Frequency	Percentage (%)
Current work ability compared with the lifetime best*	Score 4	2	0.49
	Score 5	2	0.49
	Score 6	7	1.72
	Score 7	24	5.88
	Score 8	98	24.02
	Score 9	122	29.90
	Score 10	143	35.05
Work ability in relation to the demands of the job	Not responded	10	2.45
	Excellent	193	47.30
	Good	166	40.69
	Moderate	32	7.84
	Poor	8	1.96
Work ability in relation to mental demands	Not responded	9	2.21
	Excellent	230	56.37
	Good	158	38.73
	Moderate	11	2.70
Number of current diseases diagnosed by a physician	Not responded	9	2.21
	At least 5	13	3.19
	4	10	2.45
	3	17	4.17
	2	44	10.78
Estimated work impairment due to disease	1	94	23.04
	No	230	56.37
	There is no hindrance / I have no diseases	319	78.19
	I am able to do my job, but it causes some symptoms	58	14.22
	I must sometimes slow down my work pace or change my work methods	27	6.62

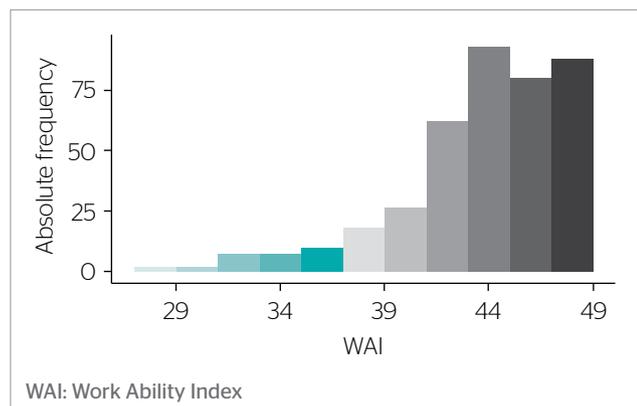
Continue...

**Table 1.** Continuation.

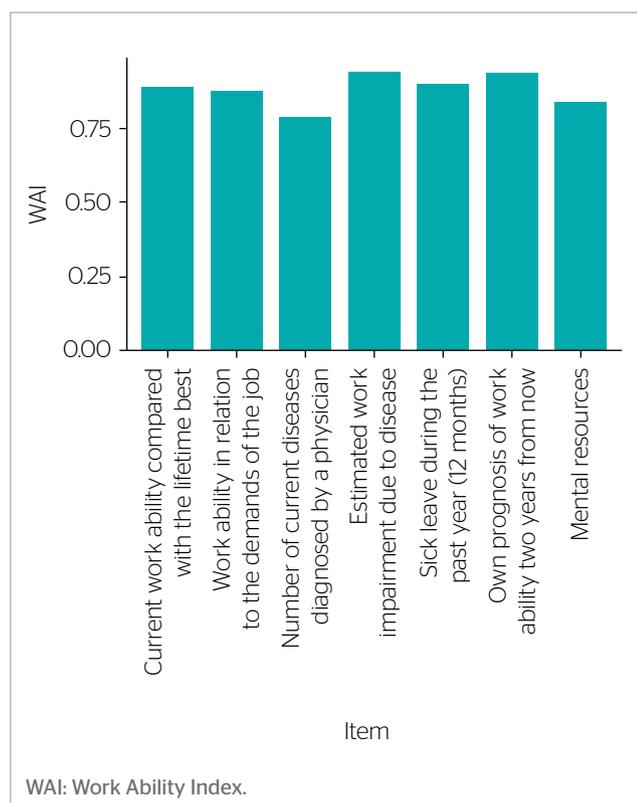
Item	Response	Frequency	Percentage (%)
Sick leave during the past year (12 months)	I must often slow down my work pace or change my work methods	1	0.25
	Not responded	3	0.74
	None at all	267	65.44
	At the most 9 days	117	28.68
Own prognosis of work ability two years from now	10 to 24 days	20	4.90
	25 to 99 days	1	0.25
	Not responded	3	0.74
	Unlikely	7	1.72
Enjoys daily tasks	No certain	36	8.82
	Relatively certain	362	88.73
	Not responded	3	0.74
Active and alert	Often	167	40.93
	Rather often	170	41.67
	Sometimes	51	12.50
	Rather seldom	16	3.92
Full of hope for the future	Not responded	4	0.98
	Often	196	48.04
	Rather often	175	42.89
	Sometimes	27	6.62
Not responded	Rather seldom	7	1.72
	Not responded	3	0.74
	Often	200	49.02
	Rather often	141	34.56
Not responded	Sometimes	48	11.76
	Rather seldom	14	3.43
	Often	2	0.49
	Not responded	3	0.74

\*incapacity for work = 0; best work ability = 10.

male, although women represent 52.2% of the population of economically active age<sup>20</sup>. Males predominate among Brazilian physicians (54.4%) and this proportion is even higher in Parana, 59.4%. However, there is a trend for



**Figure 1.** Histogram representing the work ability index results for the analyzed physicians, Maringa, 2017 (n=408).



**Figure 2.** Standardization of the items included in the instrument used to obtain the work ability index for the analyzed physicians, Maringa, 2017 (n=408).

feminization of the labor market since 2011, when women came to represent most of the younger population<sup>21,22</sup>. Feminization is also taking place in medicine, as the registrations of female doctors increased from 44% in 2000 to 54.9% in 2016. However, this process is slower in the town where the present study was conducted, as female doctors are less than 40%, a proportion smaller than that of Parana and Brazil as a whole.

The age distribution of the analyzed sample was similar to that of other Brazilian areas<sup>21</sup>, but lower than the national average for physicians, 45.4 years old. The mean age of Brazilian physicians decreased over time as a function of the creation of new medical courses<sup>20,21</sup>. About 32.2% of the current physicians in Parana are under 34 years old, a proportion slightly higher than the national one, 30.5%. The marital status of the participants was similar to that reported in the literature<sup>22-24</sup>.

The rate of physicians having completed graduate education (master and doctoral courses) per 100,000 inhabitants is small compared to other countries, such as Japan, United States and Germany<sup>25</sup>. The main reason to attend graduate education in Brazil is to pursue a university and teaching career, but this is a secondary professional activity for physicians<sup>26</sup>.

## PHYSICIANS DENSITY

The physicians density in Maringa, 4.94 / 1,000 inhabitants, is more than twice the national average, 2.18. However, the number of physicians in Brazil is increasing twice faster than the overall population. This phenomenon is due to decreased population growth and expansion of undergraduate medical courses<sup>21,22</sup>. The number of courses increased from 126 to 257 from 2003 to 2015, then to 289 in 2017 (65% at private schools) and more than 29,000 medical students graduate every year. About 43% of courses are taught at state capitals, distributed across 97 schools<sup>22,27</sup>.

The distribution of physicians is unequal across the country. In the Southeast region the ratio of physicians to the number of inhabitants is higher than in the North and Northeast. There are almost three times more physicians in the capital cities of Southern states than in the North, and more than four times in the Southeast compared to the North<sup>28</sup>. There is also inequality in the distribution of physicians, since more than half work in state capital

**Table 2.** Comparison of Student's t-test and likelihood ratio relative to sociodemographic variables, occupational characteristics and lifestyle, Maringa, 2017 (n=408).

Item	Response	Estimate	Standard error	Student's t-test (p value)	LR (p value)
Specialty	Basic	1	-	-	0.022*
	Pre-entry training	0.71	0.4	0.073	
Sex	Female	1	-	-	0.795
	Male	0.17	0.33	0.602	
Age		0.06	0.05	0.24	<0.001*
Marital status	Married	1	-	-	0.081
	Divorced	-0.14	0.64	0.824	
	Single	0.31	0.49	0.529	
	Stable union	-0.29	0.61	0.633	
	Widowed	-5.19	2.11	0.014#	
Children	No	1	-	-	0.005*
	Yes	-0.14	0.37	0.703	
Educational level	Doctorate	1	-	-	0.571
	Specialization	-1.4	0.73	0.055	
	Undergraduate	-1.72	0.79	0.031#	
	Master degree	-1.46	0.78	0.062	
	Medical residency	-0.77	0.64	0.225	
Years in the job		-0.12	0.05	0.021#	<0.001*
Weekly working hours		-0.02	0.01	0.126	0.508
Employment relationship	No	1	-	-	0.266
	Yes	0.67	0.41	0.106	
Outsourced	No	1	-	-	0.005*
	Yes	0.62	0.41	0.13	
Registered	No	1	-	-	0.349
	Yes	-0.13	0.39	0.747	
Managerial position	No	1	-	-	0.085
	Yes	-0.21	0.45	0.649	
University position	No	1	-	-	0.055
	Yes	-0.04	0.33	0.907	
Hours slept / day		0.27	0.17	0.099	0.105
Night shift	Alternate	1	-	-	0.157
	No	0.13	0.37	0.717	
	Always	-3.07	1.75	0.08	
Leisure	No	1	-	-	0.66
	Yes	0.14	0.55	0.799	
Physical activity	No	1	-	-	0.01*
	Yes	1.05	0.33	0.002#	
Smoking	No	1	-	-	0.005*
	Yes	-0.74	0.5	0.141	

Variables with significant difference on mean work ability index (WAI) at the 5% significance level: #p=0.05 on Student's t-test; \*p=0.05 on the likelihood ratio (LR) test.

cities, where just one fourth of the overall population lives. The physicians density in capital cities is 5.07 versus 1.28 / 1,000 inhabitants in the interior of states<sup>21,22</sup>. This inequality is due to income opportunities, working conditions, available health services, undergraduate courses, and medical residency programs<sup>29</sup>.

The physicians density in the South region is 2.31 / 1,000 inhabitants, and they represent 15.2% of the Brazilian physicians. The density in Parana is 2.09 / 1,000, corresponding to 5.2% of the Brazilian physicians and one third of those in the South region<sup>21,22</sup>. Maringa stands out in this regard — the physicians density is higher than the average for Brazil as a whole, the South region and the state of Parana — for being a pole of attraction: in 2017 it was named the best Brazilian town to live. It ranks fifth in healthcare facilities, with wide primary care coverage, low child mortality and high live birth rate. These factors account for the availability of three medical courses in the city<sup>30</sup>.

## OCCUPATIONAL CHARACTERISTICS

Almost half of Maringa physicians had worked for less than 10 years in the profession. This finding suggests association with the increase in medical school placements; about 300 students graduate every year taken all three medical schools together. Interestingly, the distribution of physicians according to their years in the profession is the opposite in the United States: 22.2% worked for up to 10 years, 22.9% 11 to 20 years, and 54.8% more than 20 years<sup>31</sup>. This divergence might also reflect the policies to increase the number of medical courses in Brazil<sup>21,22</sup>.

The working hours of Maringa physicians were rather long, but similar to those of all Brazilian doctors, a third of whom work more than 60 hours / week<sup>21</sup>. This fact demands particular attention, as the literature indicates that working more than 40 hours / week is a risk factor for illness, poorer quality of life, and deterioration of the quality of medical care<sup>32</sup>. The longer working hours of Maringa physicians in the early stages of the career might be due to the need to attend a medical residency program, and at the same time work at another job with better salary, as the grant received by residents does not suffice to meet their needs. In addition, physicians not only do not receive any pay for attending specialization courses, but often have to pay a fee. Finally, many students attending private schools must repay student loans (Financiamento Estudantil — FIES). By comparison to

North America, Maringa doctors work more hours / week in the early stages, but less at the end of their career<sup>31</sup>.

Self-employment is characteristic for physicians, who prefer to work in their private practice or sporadic on-duty work. In this regard, physicians differ from the overall population of Brazilian workers, 68% of whom work for some employer, 4.6% are employers themselves, and only 24.9% are self-employed<sup>20</sup>. While self-employment is frequent among physicians, more than half of the participants in the present study had some employment relationship. However, one should bear in mind that physicians might work in their private office in addition to jobs in institutions, to a total working time of more than 40 hours / week. A study conducted in Ceara, Brazil, found that 53.5% of physicians had jobs at two to four institutions<sup>9</sup>. About 78% of the Brazilian physicians have two or more jobs, and only 22% a single job<sup>19</sup>. Job instability, work overload and multiple jobs might cause stress and impair the quality of life of physicians<sup>22</sup>. A possible reason for physicians to have many jobs and undertake heavy workloads is to improve their living standards, and thus contribute to maintain the idea that medicine is a financially advantageous career which affords high social status<sup>32</sup>. In addition, physicians expose themselves to avoidable risk by neglecting the use of personal protective equipment and the rest time necessary to avoid medical errors<sup>9</sup>.

About 96.9% of Brazilian physicians work in direct patient care, and 37.8% also perform management, teaching or research activities<sup>21</sup>. The proportion of participants with managerial positions was considerably lower than the national average, but that of physicians with university positions was almost twice higher. This situation might be considered favorable, as university activities help physicians keep up-to-date, in addition to representing a part-time formal job. The fact there are three medical schools in Maringa contributes to the high number of physicians with teaching positions.

## LIFESTYLE

Although the participants' sleep duration agrees with that reported in several parts in the world<sup>33</sup>, six hours / day is considered insufficient; adults are recommended to sleep seven to eight hours / day. Sleep deprivation among physicians and medical students might result in lack of motivation, cognitive deficits, reduced professional efficacy, poorer state of health, and impaired quality of life<sup>34</sup>.

According to reports in the literature, the prevalence of burnout syndrome—a condition with substantial impact on work ability—is lower among physicians who perform physical and leisure activities<sup>35</sup>. The fact that more than 60% of the participants were physically active—a rate three times higher than the national average, 22.5%—and that almost all took part in leisure activities account for the good work ability found. The proportion of smokers was lower than the national average, 15%, and also lower than the rate for the South region, 16.1%<sup>36</sup>.

## WORK ABILITY INDEX

### Domain and total scores

The self-reported work ability was similar to the overall perception of Brazilian physicians, most of whom report excellent work ability, and believe might even come to increase their workload<sup>21</sup>. This finding might be related to the fact the participants were rather young.

In regard to the mental demands of the job, a study performed in North America found that working in a well-planned manner and with a positive attitude, together with active search for social support, is associated with reduced psychological stress and feelings of professional self-efficacy<sup>2</sup>. Agreeing with these results, a study conducted in Brazil emphasized social support and positive attitude as protective factors against harm among physicians, even those exposed to excessive job demands<sup>2</sup>.

In another study performed in Brazil, most physicians rated their physical (79%) and mental (85%) health, quality of life (68%) and job satisfaction (66.1%) adequate<sup>2</sup>. However, 50% of physicians reported to be dissatisfied with their own state of health, which denotes susceptibility to stress-related illnesses<sup>24</sup>. Occupational stress—a cause of mental disorders among physicians manifesting as burnout syndrome—is associated with the working conditions of the medical profession, such as long working hours and on-duty work<sup>2</sup>.

In a study conducted with surgeons—who are the physicians most exposed to injury—31% of the participants exhibited back injury, and 41% required sick leaves for treatment<sup>2</sup>. Several studies found association between burnout syndrome and higher sick leave rates<sup>2</sup>.

From a sample of nursing professionals—a closely related category in terms of estimated work impairment due to

disease—32% reported not to have missed any work day, 33.3% to have missed up to nine days, 21.8% 10 to 24 days, 10.3% 25 to 99 days, and 2.6% 100 or more days<sup>37</sup>.

The results for own prognosis on work ability might be related to the average age of the analyzed sample. Differently, 34% of physicians in the United States consider they would quit the profession within two years, especially the ones at the end of their career<sup>31</sup>.

WAI for nursing professionals was lower than that found for Maringa physicians<sup>11,37,38</sup>. Although several aspects of the working conditions are similar for both professions, nursing professionals are paid less for the same working time, which is a probable cause of job dissatisfaction<sup>39</sup>.

## ASSOCIATION OF WAI WITH SOCIODEMOGRAPHIC PROFILE, OCCUPATIONAL CHARACTERISTICS AND LIFESTYLE

Some studies found lower incidence of disease among married workers, as a function of the social support they get and healthy lifestyles<sup>37</sup>. Scientific evidence indicates that burnout syndrome is less frequent among physicians with higher academic degrees, probably because they feel to be better prepared to cope with professional challenges<sup>2</sup>. Individuals with high educational level tend to adopt healthy lifestyles, including physical activity, weight control, and avoidance of alcohol and smoking, as they are aware of the impact of lifestyle on health, and their financial means grant them easier access to resources<sup>4,18</sup>.

Work ability was found to decrease with age among nursing professionals<sup>37,40,41</sup>, as was also the case in the present study. However, the opposite result was found in a study conducted in Roraima, Brazil, in which more years in the medical profession was associated with less stress and better quality of life derived from wider professional experience<sup>24</sup>. Also, the number of diagnosed diseases might be related to aging, since work ability decreases together with age and the number of years in the job. The same association was found in a study performed with nursing professionals: WAI decreased from 41.23 at the beginning of the professional career to 31.97 after 15 to 24 years in the job<sup>42</sup>. Differently, in a study with North American physicians job dissatisfaction and difficulty to reconcile the personal and work lives were more frequent in the early stages of the career<sup>31</sup>.

In a population of nurses, WAI was 37.8 among smokers and 40.4 among non-smokers<sup>33</sup>, and was higher among the ones who performed physical activity. Self-assessed state of health was poorer among individuals with sedentary lifestyle and smokers<sup>40</sup>.

## STUDY LIMITATIONS

The cross-sectional design of the present study allowed evidencing several risk and protective factors relative to the work ability of physicians, but did not enable the establishment of causal relationships, for which reason cohort studies are needed to confirm the results. Then, we did not include retired physicians or those in sick leave, which might be a source of selection bias — only active professionals were considered — with the consequent effects on the calculated WAI.

One further limitation derives from the fact that the study was conducted at one single town (with high human development index — HDI) which certainly hinders comparisons to other locations with different social, economic and environmental conditions, in addition to leading to higher self-perceived work ability. Since the present is a scarcely investigated subject, we could not locate data for other towns of similar size to include comparisons of proportions in the discussion. For this reason we had resource to national and international data, and also performed comparisons to populations of nursing professionals, since they are exposed to similar working conditions.

## CONCLUSION

The high WAI values found for Maringa physicians reflect their self-perception of their work ability in the near future. We call the attention to the lower values obtained by the

older participants and those with more time in the profession, sedentary lifestyle, and smokers. While diseases have negative influence on WAI, the participants did not rate them a factor that disables them for work. Reduced mental resources was associated with impaired work ability, therefore, the high WAI values found notwithstanding, health maintenance measures should be promoted to reduce absenteeism and increase productivity, and thus ensure better healthcare provision to the population.

Based on the study limitations and the described results, we conclude there is urgent need for prospective studies on factors which influence the work process of physicians, and to establish causal links with illness and impaired professional practice. Such results will enable discussions at medical institutions, such as Regional Medical Councils and the Federal Medical Council, to call the attention to the need for public and private policies targeting illness among physicians. More particularly, the present study enables designing new studies in Maringa and other towns in Parana, as possible risk factors have already been identified and might serve as point of departure for, e.g. cohort studies.

## ACKNOWLEDGMENTS

We thank UniCesumar and Cesumar Institute of Science, Technology and Innovation (Instituto Cesumar de Ciência, Tecnologia e Inovação-ICETI) for the undergraduate research grant, Undergraduate Research Grant Program (Programa de Bolsas de Iniciação Científica-PROBIC), Cesumar. We also thank the physicians in Maringa, Parana, who voluntarily responded the questionnaire administered in the present study. Finally, our thanks to Larissa B. Fernandes who contributed to statistical analysis.

## REFERENCES

1. Torres A, Ruiz T, Müller S, Lima M. Qualidade de vida e saúde física e mental de médicos: uma autoavaliação por egressos da Faculdade de Medicina de Botucatu - UNESP. *Rev Bras Epidemiol.* 2011;14(2):264-75. <http://dx.doi.org/10.1590/S1415-790X2011000200008>
2. Gracino M, Zitta A, Mangili O, Massuda E. A saúde física e mental do profissional médico: uma revisão sistemática. *Saúde Debate.* 2016;40(110):244-63. <http://dx.doi.org/10.1590/0103-1104201611019>
3. Nogueira-Martins L. Saúde Mental dos Profissionais de Saúde. *Rev Bras Med Trab.* 2003;1(1): 56-68.
4. Cordeiro TMSC, Araújo TM. Capacidade para o trabalho entre trabalhadores do Brasil. *Rev Bras Med Trab.* 2016;14(3):262-74. <http://dx.doi.org/10.5327/Z1679-443520165115>

5. Brown S, Goske M, Johnson C. Beyond Substance Abuse: Stress, Burnout, and Depression as Causes of Physician Impairment and Disruptive Behavior. *J Am Coll Radiol*. 2009;6(7):479-85. <https://doi.org/10.1016/j.jacr.2008.11.029>
6. Junkes M, Pessoa V. Financial expense incurred by medical leaves of health professionals in Rondonia public hospitals, Brazil. *Rev Latino-Am Enfermagem*. 2010;18(3):406-12. <http://dx.doi.org/10.1590/S0104-11692010000300016>
7. Dilélio A, Facchini L, Tomasi E, Silva S, Thumé E, Piccini R, et al. Prevalência de transtornos psiquiátricos menores em trabalhadores da atenção primária à saúde das regiões Sul e Nordeste do Brasil. *Cad Saúde Pública*. 2012;28(3):503-14. <http://dx.doi.org/10.1590/S0102-311X2012000300011>
8. Nogueira-Martins L. Morbidade psicológica e psiquiátrica na população médica. *Bol Psiquiatr*. 1990;22/23:9-15.
9. Dias EC. Condições de trabalho e saúde dos médicos: uma questão negligenciada e um desafio para a Associação Nacional de Medicina do Trabalho. *Rev Bras Med Trab*. 2015;13(2):60-8.
10. Dyrbye L, West C, Satele D, Boone S, Tan L, Sloan J, et al. Burnout Among U.S. Medical Students, Residents, and Early Career Physicians Relative to the General U.S. Population. *Acad Med*. 2014;89(3):443-51. <https://doi.org/10.1097/ACM.0000000000000134>
11. Silva Junior S, Vasconcelos A, Griep R, Rotenberg L. Validade e confiabilidade do índice de capacidade para o trabalho (ICT) em trabalhadores de enfermagem. *Cad Saúde Pública*. 2011;27(6):1077-87. <http://dx.doi.org/10.1590/S0102-311X2011000600005>
12. Tuomi K, Ilmarinen J, Jahkola A, Katajarinne L, Tulkki A. Índice de capacidade para o trabalho. São Carlos: EdUFSCar; 2005.
13. Conselho Regional de Medicina do Estado do Paraná. Portal CRM-PR [Internet]. 2017 [cited 3 May 2016]. Available at: <http://www.crmpr.org.br/>
14. Morettin P, Bussab W. Estatística Básica. 7<sup>th</sup> ed. São Paulo: Saraiva; 2012.
15. R Development Core Team. R: a language and environment for statistical computing [Internet]. Viena: R Foundation for Statistical Computing; 2015 [cited 6 Jul 2017]. Available at: <http://www.Rproject.org>
16. Martinez M, Latorre M, Fischer F. Capacidade para o trabalho: revisão de literatura. *Ciênc Saúde Coletiva*. 2010;15(Suppl. 1):1553-61. <http://dx.doi.org/10.1590/S1413-81232010000700067>
17. Rigby R, Stasinopoulos D. A flexible regression approach using GAMLSS in R. London: London Metropolitan University; 2009.
18. Rao P. Sampling methodologies: with applications. New York: Chapman & Hall/CRC; 2000.
19. Sheskin D. Handbook of Parametric and Nonparametric Statistical Procedures. 3<sup>rd</sup> ed. New York: Chapman & Hall/CRC; 2003.
20. Instituto Brasileiro de Geografia e Estatística. Pesquisa Nacional por Amostra de Domicílios Contínua, 2017. Rio de Janeiro: Instituto Brasileiro de Geografia e Estatística; 2017.
21. Scheffer M, Dal Poz M, Matijasevitch A, Castilho E, Oliveira R, Nunes M, et al. Demografia Médica no Brasil 2015. São Paulo: Departamento de Medicina Preventiva, Faculdade de Medicina da USP/Conselho Regional de Medicina do Estado de São Paulo/Conselho Federal de Medicina; 2015.
22. Scheffer M, Matijasevich A, Filho B, Russo G, Bahia L, Boulos M, et al. Demografia Médica no Brasil 2018. São Paulo: FMUSP, CFM, Cremesp; 2018.
23. Nascimento-Sobrinho C, Carvalho F, Bonfim T, Cirino C, Ferreira I. Condições de trabalho e saúde dos médicos em Salvador, Brasil. *Rev Assoc Med Bras*. 2006;52(2):97-102. <http://dx.doi.org/10.1590/S0104-42302006000200019>
24. Olivares A, Bonito J, Silva R. Qualidade de vida no trabalho dos médicos da atenção básica no estado de Roraima (Brasil). *Psic Saúde Doenças*. 2015;16(1):100-11. <http://dx.doi.org/10.15309/15psd160210>
25. Teixeira R, Gonçalves T, Botelho N. A distribuição dos pós-graduados em medicina no Brasil: realidade atual. *Arq Catarin Med*. 2011;40(4):47-51.
26. Perim L, Abdalla I, Aguiar-da-Silva R, Lampert J, Stella R, Costa N. Desenvolvimento Docente e a Formação de Médicos. *Rev Bras Educ Méd*. 2009;33(Suppl. 1):70-82. <http://dx.doi.org/10.1590/S0100-55022009000500008>
27. Instituto Brasileiro de Geografia e Estatística. Portal IBGE [Internet]. 2017 [cited 13 May 2016]. Available at: <http://cidades.ibge.gov.br/xtras/perfil.php?codmun=411520>
28. Silveira R, Pinheiro, R. Entendendo a necessidade de médicos no interior da Amazônia - Brasil. *Rev Bras Educ Méd*. 2014;38(4):451-9. <http://dx.doi.org/10.1590/S0100-55022014000400006>
29. Maciel R, Branco M. Rumo ao interior: médicos, saúde da família e mercado de trabalho. Rio de Janeiro: Fiocruz; 2008.
30. Desafios dos municípios. Desafios da gestão municipal [Internet]. 2017 [cited 18 Oct 2017]. Available at: <https://www.desafiosdosmunicipios.com/>.
31. Dyrbye N, Varkey P, Boone S, Satele D, Sloan J, Shanafelt T. Physician Satisfaction and Burnout at Different Career Stages. *Mayo Clin Proc*. 2013;88(12):1358-67. <https://doi.org/10.1016/j.mayocp.2013.07.016>
32. Maciel R, Santos J, Sales T, Alves M, Luna A, Feitosa L. Multiplicidade de vínculos de médicos no Estado do CE. *Rev Saúde Públ*. 2010;44(5):950-6. <http://dx.doi.org/10.1590/S0034-89102010005000030>
33. Hilleshein E, Souza L, Lautert L, Paz A, Catalan V, Teixeira M, et al. Capacidade para o trabalho de enfermeiros de um hospital universitário. *Rev Gaúcha Enferm*. 2011;32(3):509-15.
34. Ribeiro C, Silva Y, Oliveira S. O impacto da qualidade do sono na formação médica. *Rev Soc Bras Clin Med*. 2014;12(1):8-14.
35. Barros DS, Tironi MSO, Nascimento Sobrinho CL, Neves FS, Bitencourt AAGV, Almeida AM, et al. Médicos plantonistas de unidade de terapia intensiva: perfil sócio-demográfico, condições de trabalho e fatores associados à síndrome de burnout. *Rev Bras Ter Intensiva*. 2008;20(3):235-40. <http://dx.doi.org/10.1590/S0103-507X2008000300005>
36. Instituto Brasileiro de Geografia e Estatística. Pesquisa nacional de saúde 2013: percepção do estado de saúde, estilos de vida e doenças crônicas. Rio de Janeiro: Instituto Brasileiro de Geografia e Estatística; 2014.
37. Raffone A, Hennington É. Avaliação da capacidade funcional dos trabalhadores de enfermagem. *Rev Saúde Pública*. 2005;39(4):669-76. <http://dx.doi.org/10.1590/S0034-89102005000400023>
38. Prochnow A, Magnago T, Urbanetto J, Beck C, Lima S, Greco P. Work ability in nursing: relationship with psychological demands and control over the work. *Rev Latino-Am Enfermagem*. 2013;21(6):1298-305. <http://dx.doi.org/10.1590/0104-1169.3072.2367>
39. Martinez M, Latorre M, Fischer F. Validade e confiabilidade da versão brasileira do ICT. *Rev Saúde Pública*. 2009;43(3):525-32.

40. Pavão A, Werneck G, Campos M. Autoavaliação do estado de saúde e a associação com fatores sociodemográficos, hábitos de vida e morbidade na população: um inquérito nacional. *Cad Saúde Pública*. 2013;29(4):723-34. <http://dx.doi.org/10.1590/S0102-311X2013000400010>
41. Monteiro M, Alexandre N, Milani D, Fujimura F. Work capacity evaluation among nursing aides. *Rev Esc Enferm USP*. 2011;45(5):177-82. <http://dx.doi.org/10.1590/S0080-62342011000500021>
42. Moreira P, Silvino Z, Cortez E. Saúde do trabalhador: Atenção subsidiada pelo Índice de Capacidade para o Trabalho. *Rev Enferm UFPE online*. 2016;10(1):18-23. <http://dx.doi.org/10.5205/reuol.8423-73529-1-RV1001201603>

---

Correspondence address: Mariana Evangelista Gracino - Rua Darvim Mariano, 110 - Jardim São Tomás - CEP: 86073-630 - Londrina (PR), Brazil - E-mail: [mariana.gracino@hotmail.com](mailto:mariana.gracino@hotmail.com)