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Measuring diet quality in health personnel of a Chilean hospital using the Healthy Eating Index

Calidad de la dieta del personal de salud de un hospital chileno según el índice de alimentación saludable

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Abstract

Introduction: Evidence has shown that personnel working in hospital services have a high probability of developing modifiable risk factors associated with noncommunicable diseases such as poor nutrition, high levels of stress, changes of sleep patterns and a sedentary lifestyle.

Objective: To assess diet quality among health personnel who eat at the cafeteria of the Hospital Regional de Temuco based on their work shifts, sex, and age. The Healthy Eating Index (HEI) was used to measure diet quality.

Materials and methods: Cross-sectional study conducted on 201 workers (156 women and 45 men) who were asked to complete a survey on food consumption in order to evaluate their individual HEI. The questionnaire was divided by food groups.

Results: The average age was 34.8±10.7 years and the average HEI score was 67.5 ± 14.5. 12.9% of the participants had unhealthy eating habits, 65.2% required dietary changes, and 21.9% had a healthy diet. Statistically significant differences were observed with respect to the HEI score according to sex (p=0.033) and age (p=0.009). No statistically significant differences were found between the HEI score and the shift system (p=0.334).

Conclusions: Most participants need to modify their eating habits. Therefore, hospitals, as a workplace, should implement actions that promote the adoption of healthy eating habits among their staff, particularly in the case of men, who had significantly low HEI scores in several food groups compared to women.

Keywords: Risk Factors; Non-communicable Diseases; Diet; Cross-sectional Studies; Health Personnel; Surveys and questionnaires (MeSH).

Resumen

Introducción. Se ha reportado que los trabajadores hospitalarios tienen una alta probabilidad de presentar factores de riesgo modificables asociados al desarrollo de enfermedades crónicas no transmisibles, tales como mala alimentación, altos niveles de estrés y cambios de los patrones del sueño.

Objetivo. Determinar la calidad de la dieta del personal de salud que usa los servicios del Casino de Funcionarios de Hospital Dr. Hernán Henríquez Aravena de Temuco, Chile, de acuerdo a sistemas de turno, sexo y edad. Para la medición de la calidad de la dieta se utilizó el índice de alimentación saludable (IAS).

Materiales y métodos. Estudio transversal realizado en 201 trabajadores (156 mujeres y 45 hombres), a quienes se les solicitó completar una encuesta sobre consumo de alimentos para evaluar sus IAS; el instrumento estuvo dividido por grupos de alimentos.

Resultados. La edad promedio de la muestra fue 34.8±10.7 años y el puntaje promedio de IAS fue 67.5±14.5. El 12.9% de los participantes tenía hábitos alimenticios poco saludables, el 65.2% requería cambios dietarios y el 21.9% presentaba una alimentación saludable. Se observaron diferencias estadísticamente significativas respecto al IAS según sexo (p=0.033) y edad (p=0.009), pero no entre puntaje del IAS y el sistema de turnos (p=0.334).

Conclusiones. La mayoría de los participantes necesita modificar sus hábitos alimenticios, por lo que es necesario que en los hospitales, como lugar de trabajo, se implementen acciones que promuevan la adopción de hábitos alimenticios saludables por parte del personal de salud, en particular en el caso de los hombres, quienes tuvieron puntajes de IAS significativamente bajos en varios grupos de alimentos en comparación con las mujeres.

Palabras clave: Factores de riesgo; Enfermedades no transmisibles; Dieta; Estudios transversales; Encuestas y cuestionarios (DeCS).

Introduction

From an epidemiological perspective, chronic noncommunicable diseases (NCD) generate a large disease burden worldwide.[1] Eating habits and lifestyle play a determining role in the development of such diseases.[2]

Work is one of the least addressed environments from the point of view of health public policies. In this regard, the World Health Organization and the International Labour Organization have identified the work environment as a priority area for intervention and promotion of healthy lifestyles since socioeconomic level, sex, shift systems, and the availability of and access to food in these environments affect people's health and, consequently, their work performance.[3-5]

International experience shows that people working in hospital services are more likely to have modifiable risk factors associated with the development of NCD, such as changes in sleeping patterns, poor diet, overweight, smoking, and high levels of stress.[6-15] Moreover, several studies show that working through night shift systems has repercussions on the metabolism, causing a negative impact on people's health.[16-22]

On the other hand, current evidence shows that the attitudes, behaviors and conducts of health professionals are behavioral models for health service users when promoting health.[23-26] Hence the relevance of analyzing these conditions as factors to be considered in the design of health service delivery activities in the community.

Diet quality analysis emerges as a tool to examine the relationship between dietary factors and chronic diseases.[27-29] One of the most widely used methodologies to this end is the Healthy Eating Index (HEI), which is an algorithm designed in the United States in 1995 to measure adherence to dietary guidelines (food pyramid) and adequately demonstrate the relationship between adherence and diet quality.[30]

The HEI was adapted in Chile in previous studies and allowed finding low compliance with dietary recommendations in the population studied.[31-33]

In this scenario, the objective of the present study was to determine diet quality among the health personnel that use the cafeteria services of the Hospital Dr. Hernán Henríquez Aravena (HHHA) of Temuco, Chile, according to shift systems, sex and age.

Materials and methods

Characterization of the study

A cross-sectional study was carried out between May and July 2017, in 214 HHHA workers, beneficiaries of the food service of the hospital, who were selected using non-probabilistic sampling. Data were collected through a food frequency questionnaire; since 13 participants did not fill out their forms entirely, the final sample consisted of 201 workers.

The questionnaire administered, which was previously validated in the Chilean adult population,[33] was used to collect information on workers' age, sex, and shift system. Information regarding the shifts was classified into three categories:

Day shifts: The shift starts at 8:00h and ends at 16:48h.
Third shift: The shift starts at 8:00h and ends at 20:00h for 2 consecutive days, followed by a shift starting at 20:00h and ending at 8:00h for 2 consecutive days.

Fourth shift: The shift starts at 8:00h and ends at 20:00h for 1 day, followed a shift starting at 20:00h and ending at 8:00h for 1 day.

The data obtained were used to calculate the HEI scores, which, on this occasion, consisted of 10 components that included, on the one hand, the consumption of cereals, vegetables, fruits, dairy products, legumes, meat, cold meats, sweetened products and sweetened beverages, and on the other hand, the variety of the food. Depending on the consumption frequency, the food groups received different scores; in total, the sum of the responses had a maximum score of 100:

Cereals, vegetables, fruits and dairy products: 10 points for daily consumption, 7.5 points for 3 or more times a week, 5 points for 1 or 2 times a week, 2.5 points for less than once a week, and 0 points for never or hardly ever.
Meat and vegetables: 10 points for consumption 1 or 2 times a week, 7.5 points for 3 or more times a week, 5 points for less than once a week, 2.5 points for daily consumption and 0 points for never or almost never.
Cold meats, sugars and sweetened drinks: 10 points for never or almost never, 7.5 points for less than once a week, 5 points for 1 or 2 times a week, 2.5 points for 3 or more times a week and 0 points for daily consumption.

To classify the HEI, the same cut-off points used by the Chilean Ministry of Health's 2014 National Food Consumption Survey (ENCA) were taken into account.[33] that is, scores above 80 indicated a healthy diet; between 51 and 80, a diet requiring change; and below 50, an unhealthy diet.

Statistical analysis

Tables with their corresponding frequencies were used to carry out a descriptive analysis of the data using the statistical program STATA v14. Categorical variables were expressed in percentages and continuous variables in means and standard deviations.

Using an inferential statistics analysis, the association hypothesis between the exposure variables (sex, shift system and age) and the outcome variables (HEI) were compared using the chi-square test.

For the specific case of continuous variables, a normality analysis was carried out with the Shapiro-Wilk test, which allowed obtaining a normal distribution for the values evaluated. Moreover, the Student's t-test and the analysis of variance (ANOVA) were used to analyze differences between sex and HEI scores and differences between consumption by food groups, respectively. For all applied tests, a value $p < 0.05$ was considered as statistically significant.

Ethical considerations

To conduct the present study, the ethical principles for medical research on human subjects established by the Declaration of Helsinki were followed.[34] The Ethics Committee of Servicio de Salud Araucanía Sur endorsed this study as stated in Minutes No. 7068 of March 10, 2017. After being informed of the purpose of the study, participants were asked to sign the informed consent form.

Results

Table 1 summarizes food consumption characteristics in the 201 workers who participated in the research.

Table 1. Characteristics of food consumption according to the Healthy Eating Index among a group of workers from the Hospital Dr. Hernán Henríquez Aravena in Temuco. 2017.

Variables		n (%)	Average HEI Score (x̄±σ)	p-value *	Diet			p-value †
				Unhealthy	Modifications required	Healthy		
				n (%)				
Total sample		201 (100)	67.5±14.5	-	26 (12.93)	131 (65.17)	44 (21.89)	-
Sex	Female	156 (77.61)	68.6±13.6	0.033 ‡	16 (10.25)	105 (67.30)	35 (22.43)	0.108
	Male	45 (22.39)	63.4±16.7		10 (22.22)	26 (57.77)	9 (20)	
Age (years)	<30	84 (41.79)	63.9±14.8	0.009 ‡	14 (16.66)	58 (69.04)	12 (14.28)	0.205
	30-50	91 (45.27)	69.5±14.0		10 (10.98)	56 (61.53)	25 (27.47)	
	>50	26 (12.93)	71.8±13.0		2 (7.69)	17 (65,338)	7 (26.92)	
Shift system	Day shift	99 (49.25)	68.9±13.4	0.334	11 (11.11)	63 (63.63)	25 (25.25)	0.576
	Third shift	23 (11.44)	64.8±1.6		5 (21.73)	14 (60.86)	4 (17.39)	
	Fourth shift	79 (39.30)	66.4±1.8		10 (12.65)	54 (68.35)	15 (18.98)	

HEI: Healthy Eating Index; x̄: mean; σ: standard deviation.
* Values obtained by Student's t test.
† Values obtained by chi square test.
‡ Statistical significance was set at p<0.05.
Source: Own elaboration.

The average age of the sample was 34.8±10.7 years, with a range of 19 to 61 years; the population was predominantly female (156 women vs. 45 men). Most participants had a day shift, followed by the fourth shift and the third shift.

The average HEI score was 67.5±14.5. In addition, 21.9% of the population studied had a healthy diet, 65.2% required changes and 12.9% had unhealthy eating habits.

Statistically significant differences were found regarding the HEI score by sex (p=0.033) —as women scored higher (68.6±13.6)— and age (p=0.009), with participants over 50 years old scoring higher (71.8±13.0); however, these differences were not observed between the HEI scores and the working shift system (p=0.334).

Food consumption in the men and women of the different food groups is described in Table 2.

Table 2. Comparison of average scores by food groups according to sex in a group of workers from the Hospital Dr. Hernán Henríquez Aravena in Temuco. 2017.

Diet	Female (x̄±σ)	Male (x̄±σ)	Total sample (x̄±σ)	p-value *
Cereals	6.8±2.3	6.3±2.1	6.7±2.3	0.322
Vegetables	8.6±2.2	7.7±2.5	8.4±2.3	0.040 ‡
Fruits	7.3±2.9	7.2±3.3	7.3±3.0	0.226
Dairy products	7.1±2.7	6.9±2.4	7.1± 2.4	0.206
Meat	8.0±3.0	7.6±3.1	7.9±3.0	0.099
Legumes	8.0±3.0	8.1±3.4	8.1±3.1	0.231
Cold meats	6.6±2.9	5.1±3.0	6.2±3.0	0.036
Sugary products	5±3.3	5.3±3.3	5.0±3.3	0.231
Sweetened beverages	6.6±3.6	5.6±3.2	6.4±3.5	0.046

* Values obtained by means of an analysis of variance.
† Statistical significance was set at p<0.05.
Source: Own elaboration.

The highest food consumption score was found in the group of vegetables (8.4±2.3) and the lowest, in the group of sweetened products (5.0±3.3). Likewise, when comparing the results, statistically significant differences were found between men and women in consumption of vegetables (p=0.040), cold meats (p=0.036) and sweetened beverages (p=0.046), with a higher score among women.

Discussion

In the present study, 12.93% of the participants had unhealthy eating habits, 65.17% required dietary changes, and 21.89% had a healthy diet. These results differ from what was reported in the 2014 ENCA, where the percentages were 7.8%, 86.9% and 5.3%, respectively, for these same variables.[33]

The findings of this study also differ from those reported in Brazil by Previdelli et al.[35] in manufacturing workers and by De Lima-Brasil et al.[36] in construction workers, who found that 11% and 13.5% had healthy diets; 87% and 76.3 required dietary modifications, and that 2% and 10.2% had unhealthy diets, respectively.

It should be noted that the results of this study could be explained by the fact that health workers are more aware of the relevance of food to health and well-being, influencing their eating habits.[26]

A notable finding of the present study is that statistically significant differences were found in the HEI score by sex because women had higher average scores (p=0.033; 68.6±13.6), and age since the highest scores were found in participants over the age of 50 (p=0.009; 71.8±13.0). These results agree with the study conducted by Hemiö et al.[37] in airline workers performing shift work in Finland; the researchers also found that women had better nutrition compared to men.

Although no statistically significant results were found when associating diet with the shift system (p=0.334), a trend towards healthier eating habits was observed in the day shift (25% versus 17% in the third shift and 19% in the fourth shift). On the other hand, the highest unhealthy eating rates were found in the third shift with 21.7%; the day shift and the fourth shift had very similar values, 11.1% and 12.7%, respectively.

Other studies in health care workers also failed to find results associating shift work with significant poor eating habits.[38,39] However, a study conducted in Japanese nurses reported a statistically significant association between participants working on rotating shifts and poor diet.[40]

The most commonly consumed food groups among the workers surveyed in this study were vegetables, legumes, cold meats, and sweetened products, which is partially consistent with the study by Tada et al.,[41] who, in a research conducted in Japan with health care workers working in shifts, found a high consumption of sugars and sweetened beverages that was associated with less sleep. It should be noted that the sleep variable was not studied in this research.

Likewise, statistically significant differences were observed according to sex for the consumption of vegetables (p=0.040), cold meats (p=0.036) and sweetened drinks (p=0.046), being women the most frequent consumers of vegetables and men who had a higher intake of cold meats and sweetened drinks. This result agrees with what was found in a study carried out in Chile in 2016, which highlights that 78% of women and 70% of men said they agreed with the statement "I regularly eat fruits and vegetables." Furthermore, the women in that research considered they had healthy eating habits and showed greater concern than men for reading the nutrition facts label.[42]

One of the limitations of this study was that other variables, such as educational attainment, body mass index or quantity and quality of sleep, were not evaluated, and they may have a decisive role on workers' diet.[21] Quantifying the contribution of energy and macronutrients in the diet was not possible either and this could generate differences in the nutritional quality of the food in the nutritional adequacy assessment. Finally, because this is a cross-sectional study, temporality in the measurement of the variables did not allow establishing causal associations between exposure factors and the health event. However, the results of this research provide relevant information to develop nutritional education programs that can be used in disease prevention interventions for health workers.

Conclusions

Most participants need to modify their eating habits. Therefore, hospitals, as a workplace, should implement actions that promote the adoption of healthy eating habits among their staff, particularly in the case of men, who had significantly low HEI scores in several food groups compared to women.

Conflicts of interest

None stated by the authors.

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References

1. Chile. Ministerio de Salud Pública. Informe final estudio de carga de enfermedad y carga atribuible. Santiago de Chile: Gobierno de Chile; 2008 [cited 2018 Aug 2]. Available from: https://bit.ly/3jCZMvZ.
2. Organización Mundial de la Salud (OMS). Chile. Enfermedades no transmisibles Perfiles de países. Ginebra: OMS; 2018 [cited 2018 Aug 2]. Available from: https://bit.ly/2GqFBDK.
3. World Health Organization (WHO). Workplace health promotion. Geneva: WHO; 2010 [cited 2018 Aug 2]. Available from: https://bit.ly/2EIxBNy.
4. Wanjek C. Food at work. Workplace solutions for malnutrition, obesity and chronic diseases. Geneva: International Labour Office; 2005 [cited 2018 Aug 2]. Available from: https://bit.ly/34YLQII.
5. Organización Internacional del Trabajo (OIT). Un enfoque integral para mejorar la alimentación y nutrición en el trabajo: Estudio en empresas chilenas y recomendaciones adaptadas. Santiago de Chile: OIT; 2012 [cited 2018 Aug 2]. Available from: https://bit.ly/2YXVAiq.
6. Zapka JM, Lemon SC, Magner RP, Hale J. Lifestyle behaviours and weight among hospital-based nurses. J Nurs Manag. 2009;17(7):853-60. https://doi.org/drwd7q.
7. Mota MC, De-Souza DA, Rossato LT, Silva CM, Araújo MBJ, Tufik S, et al. Dietary patterns, metabolic markers and subjective sleep measures in resident physicians. Chronobiol Int. 2013;30(8):1032-41. https://doi.org/d7vz.
8. Leventer-Roberts M, Zonfrillo MR, Yu S, Dziura JD, Spiro DM. Overweight Physicians During Residency: A Cross-Sectional and Longitudinal Study. J Grad Med Educ. 2013;5(3):405-11. https://doi.org/d7v2.
9. Phiri LP, Draper CE, Lambert E V, Kolbe-Alexander TL. Nurses' lifestyle behaviours, health priorities and barriers to living a healthy lifestyle: a qualitative descriptive study. BMC Nurs. 2014;13(1):38. https://doi.org/gb5jqv.

10. Perry L, Gallagher R, Duffield C. The health and health behaviours of Australian metropolitan nurses: an exploratory study. BMC Nurs. 2015;14(1):45. https://doi.org/gb5jtm.

11. Cheung T, Yip PSF. Lifestyle and Depression among Hong Kong Nurses. Int J Environ Res Public Health. 2016;13(1):135. https://doi.org/f8jd9m.

12. Abu Dabrh AM, Gorty A, Jenkins SM, Murad MH, Hensrud DD. Health Habits of Employees in a Large Medical Center: Time Trends and Impact of a Worksite Wellness Facility. Sci Rep. 2016;6(1):20804. https://doi.org/f788rx.

13. Mota MC, Waterhouse J, De-Souza DA, Rossato LT, Silva CM, Araújo MBJ, et al. Association between chronotype, food intake and physical activity in medical residents. Chronobiol Int. 2016;33(6):730-9. https://doi.org/ggzc6f.

14. Mota MC, Waterhouse J, De-Souza DA, Rossato LT, Silva CM, Araújo MBJ, et al. Sleep pattern is associated with adipokine levels and nutritional markers in resident physicians. Chronobiol Int. 2014;31(10):1130-8. https://doi.org/ggpq46.

15. Sanabria-Fernand PA, González LA, Urrego DZ. Estilos de vida saludable en profesionales de la salud colombianos, estudio exploratorio. Revista Med. 2007 [cited 2018 Aug 2];15(2):207-17. Available from: https://bit.ly/31SkCBF.

16. Waterhouse J, Buckley P, Edwards B, Reilly T. Measurement of, and Some Reasons for, Differences in Eating Habits Between Night and Day Workers. Chronobiol Int. 2003;20(6):1075-92. https://doi.org/dfdksn.

17. Morikawa Y, Miura K, Sasaki S, Yoshita K, Yoneyama S, Sakurai M, et al. Evaluation of the Effects of Shift Work on Nutrient Intake: A Cross-sectional Study. J Occup Health. 2008;50(3):270-8. https://doi.org/chrv5g.

18. De Bacquer D, Van Risseghem M, Clays E, Kittel F, De Backer G, Braeckman L. Rotating shift work and the metabolic syndrome: a prospective study. Int J Epidemiol. 2009;38(3):848-54. https://doi.org/b7428q.

19. Balieiro LCT, Rossato LT, Waterhouse J, Paim SL, Mota MC, Crispim CA. Nutritional status and eating habits of bus drivers during the day and night. Chronobiol Int. 2014;31(10):1123-9. https://doi.org/ggpq42.

20. Brum MCB, Filho FFD, Schnorr CC, Bottega GB, Rodrigues TC. Shift work and its association with metabolic disorders. Diabetol Metab Syndr. 2015;7(1):45. https://doi.org/gfwmj7.

21. Proper KI, Van de Langenberg D, Rodenburg W, Vermeulen RCH, van der Beek AJ, van Steeg H, et al. The Relationship Between Shift Work and Metabolic Risk Factors : A Systematic Review of Longitudinal Studies. Am J Prev Med. 2016;50(5):e147-57. https://doi.org/ggj9bs.

22. Vyas MV, Garg AX, Iansavichus AV, Costella J, Donner A, Laugsand LE, et al. Shift work and vascular events: systematic review and meta-analysis. BMJ. 2012;345:e4800. https://doi.org/f25gt3.

23. da SIlda Mde L, Martins JR, Shiroma GM, Ortolani MC, Horie LM, Waitzberg DL. Nutritional recommendation alone does not change the obesity profile of health professionals. Nutr Hosp. 2008 [cited 2018 Aug 2];23(5):429-32. Available from: https://bit.ly/3lMGi9U.

24. Oliva P, Buhring K, Godoy S, Bustos M. Percepción de la función profesional del nutricionista por parte de los usuarios de atención primaria. Rev Chil Nutr. 2010;37(2):165-8. https://doi.org/dzzg72.

25. Zhu DQ, Norman IJ, While AE. Nurses' self-efficacy and practices relating to weight management of adult patients: a

path analysis. Int J Behav Nutr Phys Act. 2013;10(1):131. https://doi.org/d7v5.

26. While AE. Promoting healthy behaviours - do we need to practice what we preach? London J Prim Care (Abingdon). 2015;7(6):112-4. https://doi.org/gdsggh.

27. Hu FB. Dietary pattern analysis: a new direction in nutritional epidemiology. Curr Opin Lipidol. 2002;13(1):3-9. https://doi.org/dzfrnv.

28. Kant AK, Graubard BI. A comparison of three dietary pattern indexes for predicting biomarkers of diet and disease. J Am Coll Nutr. 2005;24(4):294-303. https://doi.org/f3vnx2.

29. Kant AK. Dietary patterns: biomarkers and chronic disease risk. Appl Physiol Nutr Metab. 2010;35(2):199-206. https://doi.org/bm3m9x.

30. Gil Á, Martinez-de Victoria E, Olza J. Indicators for the evaluation of diet quality. Nutr Hosp. 2015;31(Suppl 1):128-44. https://doi.org/d7v6.

31. Pinheiro AC, Atalah E. Propuesta de una metodología de análisis de la calidad global de la alimentación. Rev Med Chil. 2005;133(2):175-82. https://doi.org/bp8gp9.

32. Ratner R, Hernández P, Martel J, Atalah E. Calidad de la alimentación y estado nutricional en estudiantes universitarios de 11 regiones de Chile. Rev Med Chil. 2012;140(12):1571-9. https://doi.org/d7v7.

33. Universidad de Chile. Encuesta Nacional de Consumo Alimentario. Informe Final. Santiago de Chile: Universidad de Chile; 2014 [cited 2018 Aug 2]. https://bit.ly/3hTfp1V.

34. World Medical Association (WMA). WMA Declaration of Helsinki – Ethical principles for medical research involving human subjects. Fortaleza: 64th WMA General Assembly; 2013.

35. Previdelli ÁN, Lipi M, Castro MA, Marchioni DM. Dietary Quality and Associated Factors among Factory Workers in the Metropolitan Region of São Paulo, Brazil. J Am Diet Assoc. 2010;110(5):786-90. https://doi.org/fj98tc.

36. De Lima-Brasil EC, de Araújo LM, de Toledo-Vianna RP. Nutritional and food insecurity of construction workers. Work. 2016;54(3):601-8. https://doi.org/d7vm.

37. Hemiö K, Puttonen S, Viitasalo K, Härmä M, Peltonen M, Lindström J. Food and nutrient intake among workers with different shift systems. Occup Environ Med. 2015;72(7):513-20. https://doi.org/f7fwr2.

38. Hulsegge G, Boer JM, van der Beek AJ, Verschuren WM, Sluijs I, Vermeulen R, et al. Shift workers have a similar diet quality but higher energy intake than day workers. Scand J Work Environ Health. 2016;42(6):459-68. https://doi.org/f9bfq8.

39. Beebe D, Chang JJ, Kress K, Mattfeldt-Beman M. Diet quality and sleep quality among day and night shift nurses. J Nurs Manag. 2017;25(7):549-57. https://doi.org/d7v8.

40. Yoshizaki T, Kawano Y, Noguchi O, Onishi J, Teramoto R, Sunami A, et al. Association of eating behaviours with diurnal preference and rotating shift work in Japanese female nurses: a cross-sectional study. BMJ Open. 2016;6(11):e011987. https://doi.org/f9j8q5.

41. Tada Y, Kawano Y, Maeda I, Yoshizaki T, Sunami A, Yokoyama Y, et al. Association of body mass index with lifestyle and rotating shift work in Japanese female nurses. Obesity (Silver Spring). 2014;22(12):2489-93. https://doi.org/d7vp.

42. Salcobrand, Clínica Universidad de los Andes, Gfk Adimark. Índice de Bienestar 2016. Santiago de Chile: 2016 [cited 2020 Sep 14]. Available from: https://bit.ly/3jEAQVl.