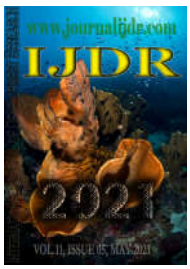
ISSN: 2230-9926

Available online at http://www.journalijdr.com

IJDR

International Journal of Development Research
Vol. 11, Issue, 05, pp. 47465-47469, May, 2021
https://doi.org/10.37118/ijdr.22040.05.2021



RESEARCH ARTICLE OPEN ACCESS

MANAGEMENT OF MODIFIABLE FACTORS OF HEALTH RISKS: ADDITIONAL HEALTH AND TECHNOLOGY, METRIC IN FAVOR OF HEALTH

***Paulo Reis, Luisa Queiroz Vasconcelos, Manoel Joaquim Fernandes de Barros and Hélder Uzêda Castro**

[1]ICI, Federal University of Bahia (UFBA); [2]LBTB, Federal University of Bahia (UFBA); Metropolitan Union of Education and Culture (UNIME); [3]PPGA and PPDRU, Salvador University (UNIFACS); Grenoble École de Management; [4]PPGA and PPDRU, Salvador University (UNIFACS); CICS.NOVA, New University of Lisbon

ARTICLE INFO

Article History:
Received 02nd February, 2021
Received in revised form
20th March, 2021
Accepted 30th April, 2021
Published online 30th May, 2021

Key Words:
Modifiable Risk Factors, Health Promotion, Health Care Costs, Indicators, Information Technology.

****Corresponding author:** Paulo Reis*

ABSTRACT

This article discusses quality of life and its association with health promotion, qualified as an integrated strategy for healthy people in healthy organizations. It uses Data Science resources and addresses the purpose of disease prevention and the development of workers' health and well-being potential. It presents conditions and data on the implementation of a Health Modifiable Risk Factor Management model, as well as the economic and financial impacts of cardiovascular pathologies, including the top 10 causes of death in 2020 in the USA (temporary data) and a list of health care cost studies with an emphasis on cardiovascular pathologies and modifiable health risk factors. Likewise, in the geographic analysis, it demonstrates the increase in the cost of medical care in Brazil. The conclusions suggest that the use of metrics supported by the consolidated scientific literature aims to redirect the state of imbalance to equilibrium, from negativity to positivity and from excess costs to cost reduction.

Citation: ***Paulo Reis, Luisa Queiroz Vasconcelos, Manoel Joaquim Fernandes de Barros and Hélder Uzêda Castro.*** "Management of modifiable factors of health risks: additional health and technology, metric in favor of health.*", International Journal of Development Research*, 11, (05), 47465-47469.

INTRODUCTION

The expression quality of life was used for the first time by the President of the United States, Lyndon Johnson, in 1964, when he declared that objectives cannot be measured by banks' balance sheets and other economic indicators. They can only be measured by the quality of life they provide to people. The term quality of life, as applied in the medical literature, does not seem to have a single meaning. "Health conditions", "health promotion", "social functioning" and "quality of life" have been used interchangeably and the very definition of quality of life does not appear in most research or specialized texts that use or propose instruments for your evaluation. The interest in concepts such as standard of living and quality of life was initially shared by social scientists, philosophers and politicians, being progressively dehumanized in medicine and related sciences by technological development. Initially, such concepts refer to a movement within the human and biological sciences in the sense of valuing parameters that are broader than the control of symptoms, the decrease in mortality or the increase in life expectancy. For the purposes of this work, quality of life is more general and includes a potentially wider range of conditions that can affect an individual's perception, feelings and behaviors related to their daily functioning, including, but not limited to, their health status and interventions. Its evaluation was added to randomized clinical trials as the third dimension to be evaluated, in addition to efficacy (modification of the disease by the effect of the medication) and safety (adverse reaction to the medication) (BECH, 1995). Oncology was the specialty that, par excellence, faced the need to assess the living conditions of patients who had their survival increased with the proposed treatments, because often, in the search of adding years to life, they were left to their own need to add life to the years. The Quality of Life Group of the WHO Mental Health division defined quality of life as "the individual's perception of their position in life in the context of the culture and value system in which they live and in relation to their goals, expectations, standards and concerns ". (WHO, 1994). Health-related quality of life and subjective health status are related concepts centered on the individual's subjective assessment, but necessarily linked to the impact of health status on the individual's ability to live to the full.

The promotion of health at work, in organizations or economic agents can be characterized as an integrated strategy for healthy people in healthy companies. It aims to prevent diseases and develop the health and well-being potential of workers in the workplace, contributing to the motivation and active and widespread participation of employers, workers and society in general (Luxembourg Declaration, 1997), in a joint effort to improve and correct environmental working conditions, eliminate risk factors and promote safe and healthy work, favoring more sustainable results, as well as the development of preventive programs aimed at preventing the general morbidity of the active population and the consequent reduction rising costs. health care.

Cardiovascular diseases (CVD), infarction, stroke and cardiac arrhythmias, in addition to those that have atherosclerosis as their main characteristic, stand out as the main cause of death and disability in the world. CVDs are a group of multifactorial diseases, but with lifestyle and an aging population as the main risk factors related to new personal and professional dynamics. Socioeconomic, psychological, demographic (including geography and territorial configurations) and environmental issues are intertwined with the development of risk factors for chronic diseases, being, therefore, relevant factors in studies that analyze the set of all modifiable factors involved in the development of CVD. (SCHMIDT, MI; et al., 2011).
As the main cause of death in the world, medical costs, hospital expenses, reduction of labor, social security costs, negative externalities, such as the occurrence of high associated morbidity and mortality, generate large investments aimed at finding their main determinants in public sectors. and private. (LUNKES, L. C; et al., 2018) Considering the impact in social and economic terms, it is necessary to invest in disease prevention and health promotion, through adaptations to the different characteristics of the populations. (SOUSA, et al., 2017). This article presents a proposal for a bibliometric review to implement a modifiable health risk factor management, using Data Science instruments, bypassing any barriers to the implementation of preventive measures. For that, two populations with different characteristics were considered, but both could be the object of preventive actions in an organized and stimulated way.

MATERIAL AND METHODS

This investigation is characterized as a bibliographic, secondary, retrospective and descriptive review, using analyzes based on Data Science. Only journals were considered indexed publications with the following descriptors: Modifiable Risk Factors, Health Promotion; Health costs, indicators; Information Technology. Only articles in English and Portuguese were selected, including, in this study, those that used an approach to describe the excess health expenditure resulting from the presence of modifiable risk factors, in some cases, considering COVID-19.

RESULTS

Analyzing the economic and financial impacts of cardiovascular pathologies, verifying information with the main causes of death in the USA in 2020 (AHMAD, 2021), it is possible to perceive, in the still provisional data of 2020, important changes in the number and classification of deaths. compared to 2019. COVID-19 was the third leading cause of death in 2020, with an estimated 345,323 deaths, being largely responsible for the increase in deaths from 2019 to 2020. Substantial increases from 2019 to 2020 also occurred by several others causes. It should be noted that, in 2020, deaths from heart disease increased by 21.4%, stroke by 6.0% and diabetes by 15.4%, when compared to 2019. The study of systematic review and meta-analysis COVID-19 and comorbidities: a systematic review and meta-analysis (MORGAN, 2020) describes that COVID-19, the third cause of death in 2020 (AHMAD, 2021), showed that knowledge is essential population with comorbidities aiming to intervene to reduce mortality. The systematic review and meta-analysis evaluated the presence of comorbidities associated with severe and fatal cases of COVID-19. Thirty-three studies were included in the systematic review and twenty-two in the meta-analysis. Of the total cases, 40.80% (95% CI: 35.49%, 46.11%) presented comorbidities, while fatal cases had 74.37% (95% CI: 55.78%, 86.97%). Hypertension was more prevalent, followed by cases of diabetes compared to the total number of cases.

Another systematic review and meta-analysis study Comorbidities in SARS-CoV-2 Patients: Systematic Review and Meta-Analysis (HANN, 2021) sought to assess the correlation between comorbidities and their role in disease exacerbation in patients with COVID-19, leading to fatal results. Hypertension, obesity, and diabetes mellitus have been identified as the most prevalent comorbidities in patients with COVID-19. The meta-analysis showed that cancer, chronic kidney disease, diabetes mellitus and hypertension were independently associated with mortality in patients with COVID-19. A third study of systematic review and meta-analysis Prevalence of comorbidities in patients and mortality cases affected by SARS-CoV2: a systematic review and meta-analysis (ESPINOSA, 2020) describes that the risk factors associated with COVID-19 are age, sex and presence of comorbidities, the most common of which are hypertension, diabetes and heart disease. The meta-analysis calculated the prevalence and geographic distribution of comorbidities in all patients admitted to intensive care units (ICUs) and the mortality rate of COVID-19.

Studies were selected based on epidemiological and clinical descriptions of patients and mortality from the disease to determine the combined prevalence of comorbidities in all patients and in cases of mortality due to COVID-19. The total prevalence of comorbidities in patients with COVID-19 was 42%, 61% in those admitted to the ICU and 77% among cases of death. Hypertension was the most prevalent comorbidity in the three groups studied, corresponding to 32%, 26% and 35%, respectively. It was found that the higher the prevalence of comorbidities, the greater the probability that the COVID-19 patient will need intensive care or die, especially if the pre-existing disease is hypertension, heart disease or diabetes. A fourth study systematic review and meta-analysis The prognostic value of comorbidity for the severity of COVID-19: A systematic review and meta-analysis study (FATHI, 2021) included 102 studies 102 articles covering 121,437 infected patients. The mean age of the patients was 58.42 years. The prevalence for the most common comorbidities was 28.30% for hypertension, 14.29% for diabetes and 12.30% for cardiovascular diseases. The presence of hypertension, diabetes and cardiovascular diseases can be considered risk factors for patients with COVID-19 infection. The 2019 Mercer March Medical Trends Worldwide (MERCER, 2019) publication describes the product of a survey involving 15 countries in the Americas, 13 countries in Asia Pacific, 22 countries in Europe and 8 countries in the Middle East and Africa (MEA) with the effective participation of 176 insurers it showed that the three main causes of cost in 2018 based on group registration or across all sectors were cancer, circulatory system diseases and gastrointestinal diseases. It was possible to verify that diseases of the circulatory system rank second in Latin America. The publication of the AON 2020 Global Medical Trend Rates Report (AON, 2020) describes the results of a survey carried out by its 105 offices distributed among the main countries in the world.

For the purposes of the purposes of this article, it can be seen that cardiovascular pathologies, high blood pressure and diabetes are among the main costs of the countries participating in the research, which covers their main economic agents and, consequently, drives up their health insurance costs. That publication points out that, for 83% of the countries surveyed, arterial hypertension was the main risk factor that drove health care costs, followed by physical inactivity with 52%, high cholesterol with 46%, inadequate diet with 44% and management stress deficient with 38%. The main risk factors recorded by AON's 105 offices were distributed by geographic region, with an important occurrence of hypertension, inadequate diet, high cholesterol, high glucose and a sedentary lifestyle in the region

of Latin America and the Caribbean as risk factors driving the cost of health care. A study published in 2012 (GOETZEL, 2012) describes research on the cost of health care for ten common health risk factors in a working population composed of a sample of 92,486 employees from seven companies. In three years, an average of US$ 82,072,456 (22.4%) of the US$ 366,373,301 was spent annually by the seven companies and attributed to the ten risk factors studied. The high risk of depression was strongly associated with an increase in annual medical expenses per capita (48%, or US$ 2,184). High blood glucose, high blood pressure and obesity were strongly related to the increase in health costs (31.8%, 31.6% and 27.4% higher, respectively), as well as smoking, physical inactivity and high stress.
This 2012 study was updated and published in 2020 (GOETZEL, 2020) with a sample of active, full-time adult employees, continuously enrolled in employer-sponsored health care plans. Employees were encouraged to respond to a health risk assessment initiated at any time in 2016, prevailing for one year. The study criteria were met by 135,219 employees from 11 employers who completed the health risk assessment.

The differences were statistically significant for the cost differences found for employees with high glucose (high-risk employees had 41.8% (US$ 5,752) more in expenses than those at lower risk); obese employees were 25.8% (US$ 4,873) more expensive than non-obese employees; employees at high risk of stress and depression were 15.7% (US$ 4,720) and 15.0% (US$ 4,717) higher, respectively; and the presence of a sedentary lifestyle showed medical expenses 10.1% (US$ 4,557) higher. Many obese employees incurred the highest cost by contributing to a $ 308 increase in annual costs per capita (across the population); high blood glucose level led to an increase of US $ 129; stress $ 118; depression US$ 71) and sedentary lifestyle US$ 82.
In aggregate and considering only statistically significant increases in the risk factors examined, the net additional costs for the 10 risk factors studied were US$ 708 or 16.9% of the total expenditure. The study's author describes that this percentage value is probably underestimated due to many other risk factors that affect costs and that were not measured in this study. It is estimated that by 2035, 45.1% of the US population will have some form of Cardiovascular Disease (CVD). This is the prediction of the Heart Disease and Stroke Statistics, 2019 Update study published by the American Heart Association. The same publication estimates that, between 2015 and 2035, the total direct medical costs of CVDs are projected to increase from $ 318 billion in 2015 to $ 749 billion in 2035. (AHA, 2019).

A survey of heart disease in Brazil estimates that approximately 45.7 million people have been affected, representing approximately 32% of the adult population. That same publication describes that in 2015 these heart diseases resulted in a financial cost of R$ 56.2 billion (about 10.7 billion dollars in 05/2021). (STEVENS, 2018). A study published in 2020 describes healthcare expenditures attributable to modifiable risk factors in the US in 2016. Data for 2016 were taken from the Institute for Health Metrics and Evaluation and estimated that these expenditures in the United States attributable to modifiable risk factors were of US$ 730.4 billion, corresponding to 27.0% of total health care expenses. Attributable expenses were largely due to five risk factors: high body mass index (US$ 238.5 billion), high systolic blood pressure (US$ 179.9 billion), high fasting glucose (US$ 171.9 billion), inadequate nutrition (US$ 143.6 billion) and smoking (US$ 130.0 billion). (BOLNICK, 2020).

This study shows high expenditure on health care attributable to modifiable risk factors and highlights the need to prevent and control risk exposure. These attributable expense estimates can contribute to the development and implementation of preventive programs to reduce risk exposure, health effects and costs. The scientific literature describes an important cost impact resulting from cardiovascular pathologies and their risk factors. In this sense, a possible intervention can be carried out in three stages: (i) diagnosis, carried out through the mapping of 14 CVD indicators, which calculate the PSI (Individual Health Profile) and PSC (Collective Health Profile) indices, based on best scientific support. The mapping can be performed by occupational health medical control systems, with information collected from operations or from accredited health companies; (ii) intervention, carried out based on the PSI and the diagnosis of potential changes, allowing mitigating interventions to be carried out in the form of prevention programs: healthy eating; reducing sedentary lifestyle; stress reduction; control of hypertension; of blood glucose control; smoking cessation, among others; and (iii) monitoring, equivalent to the management of the process, which supports steps I and II, adopting computerized resources or specialized solutions. In this context, the result of this work suggests that each participant in the preventive program must have access to a web application, allowing interaction between the coordinators of the preventive programs and their users in the form of permanent consultancy. It is known that this application must present the results of the indicators in an organized manner and the establishment of goals with a view to improving the lifestyle. Clearly, health care costs grow year on year, reaching billionaire figures with an important share allocated to the cardiovascular diseases section, increased by the increasing presence of modifiable health risk factors. Modest results from traditional preventive measures have driven studies with the approach of technologies that include mHealth apps. The resistance to imput data has been observed among the several available applications and this barrier can be overcome with the integration of occupational health programs in companies and data transfer and with the use of sensors, preferably non-invasive. It is suggested that the creation of effort or reward models to enable the commitment of users of health care plans can minimize barriers linked to human behavior. The proposal presented for the Management of Modifiable Factors for Health Risks through the creation of the “health additional”, using a metric supported by the consolidated scientific literature, has the purpose of redirecting the status of imbalance to balance, from negativity to positivity and excess to reduce costs.

DISCUSSION

The VCMH index is a measure that expresses the annual variation in the per capita hospital medical cost of individual health plan operators, over a period of 12 months in relation to the average expenses of the immediately preceding twelve months. (CASE GROUP, 2019). The National Health Agency (ANS) regulates the ceiling for individual plans, but does not set a limit for business plans, as it understands that legal entities have greater negotiating power with operators and occurs based on free negotiation between operators and companies. The most recent calculation was made based on a sample of 783.7 thousand users of individual plans (old and new) from national operators in March 2020. During this period, the variation in medical and hospital costs was 12.5 % for the 12-month period ended in March 2020, compared to the 12-month period ended in March 2019. VCMH / IESS remained above the variation in price inflation measured by the IPCA / IBGE, which was 3.3% for the same period (IESS, 2020). The Case Group claims that based on recent data released by the Institute for Supplementary Health Studies (IESS) - which forecasts an upward curve over the next 15 years, which will go from R $ 106 billion to R$ 283 billion - the Case Group defends a change in the focus of use of plans, which is currently much more focused on the search and treatment of diseases than on prevention. (CASE GROUP, 2019). According to Rafael Mota, CEO of the Case Group, "The cost-effectiveness ratio must be considered a representative indicator and the focus of action, which today is based on the search for diseases, has to shift to raising awareness of the use of the benefit, prevention and health promotion within companies". It is estimated that 60% of users of company health plans, the so-called collective plans. Increasingly, companies direct actions aimed at promoting health, but integrated actions aimed at reducing health care costs are still shy. The Occupational Health Medical Control Programs (PCMSO) could add laboratory tests and functional tests among the 14 indicators proposed here to enable the performance of a collective diagnosis and the implementation of preventive programs, if the finding is decisive. It was seen that the cost of cardiovascular pathologies reaches huge figures, both in Brazil and in the United States of America, being aggravated by the occurrence of COVID-19

and its high mortality in patients with comorbidities of a cardiovascular nature (MORGAN, 2020). Changing the culture of the human being is a difficult task, but measures can be implemented to heighten the interest of those with health problems and comorbidities. An important barrier to be overcome is the lack of interest in imputing health data in applications for smartphones (CRAIG, 2020). Health risk behaviors are the main contributors to morbidity, premature mortality associated with chronic diseases and rising health costs. Traditional interventions to modify health behaviors have not shown the expected results with modest effects, limited applicability and scale. (BOLNICK, 2020) (GOETZEL, 2012, 2020). In order to support health improvement goals and targets, notably regarding modifiable risk factors, new approaches that incorporate several intelligent technologies are being used to create more individualized digital behavior change interventions or (Digital Behavior Change Interventions - DBCIs). One study describes a systematic review of the literature with retrieval of studies from 2013 to 2020 (CRAIG, 2020) from various databases and manual searches. All DBCIs included were automated, context-sensitive digital healthcare technologies, through which user input, activity, or location influenced the intervention. The included studies addressed explicit health behaviors and reported data on behavior change results. Data extracted from the studies included the study design, type of intervention, including its functions and technologies used, behavior change techniques and target health behavior, and outcome data. Thirty-three articles were included, comprising mobile health applications (mHealth), wearable devices / sensors from the Internet of Things (wearables) and Internet-based web applications.

The most frequently adopted behavior change techniques were in the feedback and monitoring groupings, knowledge formation, planning and goals. The technologies used to apply them in an automated and context-aware manner include analytical and artificial intelligence (for example, machine learning and symbolic reasoning) that require varying degrees of access to data. Studies have shown improvements in physical activity, eating behaviors, adherence to medication and sun protection practices. DBCIs have effectively supported behavior change to improve users' health behaviors. This article presents a proposal for the implementation of a management of modifiable health risk factors bypassing the barriers for the implementation of preventive measures, considering two populations with different characteristics, but both subject to preventive actions in an organized and stimulated way. The first refers to employees of business organizations that have health care plans. These business organizations are obliged by a legal provision of the Ministry of Economy, Security, Health and Welfare Secretariat to implement Occupational Health Prevention Programs (PCMSO), duly supported by specialized systems or solutions. In this case, it is suggested, in addition to mobile health applications (mHealth), wearable devices / sensors of the Internet of Things (wearables) may be added, due to the exponential progress of this area. The second refers to beneficiaries of health care plans dependent on employees who hold such plans in business organizations. These beneficiaries should be encouraged by the employees, among other means, to make data related to health indicators available, performing the nonexistent procedures. Control systems should support primary data collection. The PSI must be built to form the Groups of Modifiable Risk Factor Groups and, similarly, a consent form for the use of personal data must be obtained.

REFERENCES

Aha. Heart Disease and Stroke Statistics, 2019 Update. A Report from the American Heart Association. Disponível na Internet: https://www.ahajournals.org/doi/epub/10.1161/CIR.0000000000000659. Acesso em 16/05/2021.

Ahmad FB, Anderson RN. The Leading Causes of Death in the US for 2020. JAMA. DOI: 10.1001/jama.2021.5469, 2021.

Aon. 2020 Global Medical Trend Rates. Disponível na Internet: https://www.aon.com/2020-global-medical-trend-rates-rising-health-plan-costs-risk-factors/index.html. Acesso em 11/05/2021.

Ashwell M, Gibson S. Waist-to-height ratio as an indicator of 'early health risk': simpler and more predictive than using a 'matrix' based on BMI and waist circumference. DOI:10.1136/bmjopen-2015-010159, 2016.

Bech P. Quality-of-Life measurements for patients taking which drugs? The clinical PCASEE perspective. Pharmacoeconomics, 1995.

Bolnick HJ, BUI AL, Bulchis A, CHEN C, CHAPIN A, Lomsadze L ET AL. Healthcare spending attributable to modifiable risk factors in the USA: an economic attribution analysis. DOI: 10.1016/S2468-2667(20)30203-6, 2020.

Craig KJT, Morgan LC, Chen C, Michie S, Fusco N, Snowdon JL, Scheufele E, Gagliardi T, SILL S. Systematic review of context-aware digital behavior changes interventions to improve health. Translational Behavioral Medicine. DOI: 10.1093/tbm/ibaa099, 2020.

Espinosa, OA et al. Prevalence of comorbidities in patients and mortality cases affected by SARS-CoV2: a systematic review and meta-analysis. Rev. Inst. Med. trop. S. Paulo, São Paulo. DOI: 10.1590/s1678-9946202062043, 2020.

Fathi M, Vakili K, Sayehmiri F, Mohamadkhani A, Hajiesmaeili M, Rezaei-Tavirani M, Eilami O. The prognostic value of comorbidity for the severity of COVID-19: A systematic review and meta-analysis study. DOI: 10.1371/journal. pone.0246190, 2021.

Goetzel RZ., Pei X, Tabrizi MJ, Henke RM, Kowlessar N, Nelson CF, Metz RD. Ten Modifiable Health Risk Factors Are Linked To More Than One-Fifth Of Employer-Employee Health Care Spendin. DOI: 10.1377/hlthaff.2011.0819 HEALTH AFFAIRS 31, NO. 11 (2012): 2474–2484, 2012.

Goetzel RZ, Henke RM, Head MA, Benevent R, Rhee K. Ten Modifiable Health Risk Factors and Employees' Medical Costs - An Update. Am J Health Promotion. 2020 Jun; 34(5):490-499. DOI: 10.1177/0890117120917850, 2020.

Grupo Case. Tudo sobre o VCMH. Grupo Case, 2019. Disponível na Internet: https://www.grupocase.com.br/noticia/grupo-case-lanca-portal-exclusivo-sobre-vcmh/. Acesso em 16/05/2021.

Hann NG W, Tipih T, Makoah NA, Vermeulen JG, Goedhals D, Sempa JB, Burt FJ, Taylor A, Mahalingam S. Comorbidities in SARS-CoV-2 Patients: a Systematic Review and Meta-Analysis. mBio Feb 2021, 12 (1) e03647-20; DOI: 10.1128/mBio.03647-20, 2021.

Iess. Variação dos Custos Médico Hospitalares - VCMH/IESS. Edição: outubro de 2020. Data-base: março de 2020. Disponível na Internet: https://www.iess.org.br/cms/rep/vcmh_base_mar2020.pdf. Acesso em 16/05/2021.

Lunkes, L. C.; Murgas, L. D. S.; Dorneles, E. M. S.; Rocha, C. B. M. DA; Machado, G. J. Fatores Socioeconômicos Relacionados ÀS Doenças Cardiovasculares: Uma Revisão. Hygeia - Revista Brasileira de Geografia Médica e da Saúde, v. 14, n. 28, p. 50 - 61, 5 jul. 2018.

MARTINS NM, ROSA BD, VILELA, PÁDUA M. Concentração de etanol em bebidas alcoólicas mais consumidas no Brasil. GED gastroenterologia endoscopia, 1989.

Matsudo S, Araujo T, Matsudo V; Andrade D; Andrade E; Oliveira LC; Braggio G. Questionário Internacional de Atividade Física (IPAQ): estudo de validade e reprodutibilidade no brasil. Atividade Física & Saúde, 2001.

Mercer Marsh. Tendências médicas pelo mundo, 2019. Disponível na Internet: http://www.mercermarshbeneficios.com.br/capital-intelectual/investigaciones/2019-medical-trends-around-the-world1.html. Acesso em 11/05/2021.

Morgan SG, SEHAYEK D, GABRIELLI S, ZHANG X, MCCUSKER C e BEN-SHOSHAN M. COVID-19 and comorbidities: a systematic review and meta-analysis. Postgraduate Medicine. DOI: 10.1080/00325481.2020.1786964, 2020.

Powell HS, Greenberg DL. Screening for unhealthy diet and exercise habits: The electronic health record and a healthier population. DOI: 10.1016/j.pmedr.2019.01.020, 2019.

Santos Kob, Araujo TM, Oliveira, NF. Estrutura fatorial e consistência interna do Self-Reporting Questionnaire (SRQ-20)

em população urbana. Cad. Saúde Pública, Rio de Janeiro, DOI: 10.1590/S0102-311X2009000100023, 2009.

Sbc. Atualização da Diretriz de Prevenção Cardiovascular da Sociedade Brasileira de Cardiologia. DOI: 10.5935/Abc. 20190204, 2019.

Schmidt, MI; Duncan, BB; Silva, GA; Menezes, AM; Monteiro, CA; Barret, SM; Chor, D; Me PR. Doenças crônicas não transmissíveis no Brasil: carga e desafios atuais. Lancet [internet] 2011. Disponível em: http://download.thelance

Silva GPF. Tabagismo e promoção da saúde: desafios para o desenvolvimento de estratégias efetivas. DOI: 10.5020/18061230.2018.7565, 2018.

Souza, H.P.et al. Spatial analysis of causes of death from cardiovascular disease and associated factors in a deployment area of a large development project. Hygeia: Revista Brasileirade Geografia Médica e Saúde, v. 13, p. 199-214, 2017.

Stevens, B; Pezzullo, L; Verdian, L; Tomlinson, J; George, A; Bacal, F. Os Custos das Doenças Cardíacas no Brasil. Arquivos Brasileiros de Cardiologia. DOI: 10.5935/abc.20180104, 2018.

Who Quality of Life Assessment (WHOQOL). The WHOQOL Group, WHO, Geneva, 1994.

Who. Índice de Massa Corpórea. Disponível na Internet: https://www.euro.who.int/en/health-topics/disease-prevention/nutrition/a-healthy-lifestyle/body-mass-index-bmi. acesso em 16/05/2021.

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