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FOOD CONSUMPTION, PHYSICAL ACTIVITY, AND SEDENTARY BEHAVIOR OF CHILDREN AND ADOLESCENTS FROM SMIARID OF BAHIA: RISE AND CONSOLIDATION OF A RESEARCH LINE AT A STATE UNIVERSITY

CONSUMO DE ALIMENTOS, ACTIVIDAD FÍSICA Y CONDUCTA SEDENTARIA DE NIÑOS Y ADOLESCENTES EN EL SEMIÁRIDO DE BAHÍA: CREACIÓN Y CONSOLIDACIÓN DE UNA LÍNEA DE INVESTIGACIÓN EN UNA UNIVERSIDAD ESTATAL

CONSUMO ALIMENTAR, ATIVIDADE FÍSICA E COMPORTAMENTO SEDENTÁRIO DE CRIANÇAS E ADOLESCENTES NO SEMIÁRIDO BAIANO: CRIAÇÃO E CONSOLIDAÇÃO DE UMA LINHA DE PESQUISA EM UMA UNIVERSIDADE ESTADUAL

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Abstract

This report describes rise and consolidation of the research line "Food consumption, physical activity and sedentary behavior of children and adolescents", at the *Núcleo de Estudos e Pesquisas em Atividade Física e Saúd*e (NEPAFIS), in a State University from Bahia. The validation study of the Web-CAAFE, an online health surveillance tool for schoolchildren, was the starting point for the rise of the line of research that was consolidated in 2019, after carrying out a school-based survey, using the Web-CAAFE to assess food consumption, physical activity, sedentary behaviors, commuting to/from school and the weight status of 2,654 students from the second to the fifth year of Elementary School in Feira de Santana, Bahia. The findings showed that: 1) there is an overlap of healthy and unhealthy behaviors among the participants; 2) there are marked gender differences in physical activities; 3) a significant number of students were overweight/obese; 4) the use of screens is associated with the consumption of unhealthy foods; 5) school infrastructure for sports, physical and leisure-time physical activities, as well as participation in physical education classes, influence students' physical activities and sedentary behaviors. Currently, the line of research is developing a study with Quilombola communities in the rural areas of Feira de Santana, and the expected results will make it possible to know the movement behaviors of students in these communities, the weight status, food consumption and the adequacy of the school meal menu to the cultural specificities of Quilombola communities.

Keywords: Motor activity; Food consumption; Health of Ethnic Minorities; Internet; Public Health.

Resumen

Este informe describe la creación y consolidación de la línea de investigación "Consumo de alimentos, actividad física y comportamiento sedentario de niños y adolescentes", en el Centro de Estudios e Investigaciones en Actividad Física y Salud (NEPAFIS), de una Universidad del Nordeste de Brasil. La validación de la herramienta online de vigilancia de la salud para escolares (Web-CAAFE) ha sido el punto de partida para su creación y la consolidación se llevó a cabo en 2019 tras una encuesta escolar en la cual a través del Web - CAAFE se evaluó el consumo de alimentos, la actividad física, el sedentarismo, los modos de ir y volver de la escuela y el estado nutricional de 2.654 estudiantes de la enseñanza fundamental de Feira de Santana, Bahía. Los hallazgos evidenciaron: 1) superposición de comportamientos saludables y no saludables entre los participantes; 2) marcadas diferencias de género en las actividades físicas; 3) 20% de estudiantes presentaban sobrepeso/obesidad; 4) el uso de pantallas asociado al consumo de alimentos poco saludables; 5) la infraestructura escolar para la práctica de actividades deportivas, físicas y de ocio, así como la participación en las clases de educación física, influyen en la actividad física y el sedentarismo de los estudiantes. Actualmente, la línea de investigación desarrolla nuevo estudio con comunidades Quilombolas del municipio, para conocer los comportamientos de circulación de los estudiantes en estas comunidades, el estado nutricional, el consumo de alimentos y la adecuación de los alimentos del menú escolar a las especificidades culturales de las comunidades.

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Palabras clave: Actividad motora; Consumo de comida; Salud de la población negra; Internet; Salud pública.

Resumo
Este relato descreve a criação e consolidação da linha de pesquisa "Consumo alimentar, atividade física e comportamento sedentário de crianças e adolescentes", no Núcleo de Estudos e Pesquisas em Atividade Física e Saúde (NEPAFIS), em uma Universidade Estadual Baiana. A realização do estudo de validação do Web-CAAFE, uma ferramenta online de vigilância em saúde de escolares, foi o ponto de partida para a criação da linha de pesquisa e sua consolidação ocorreu, em 2019, após realização de uma pesquisa de base escolar, utilizando o Web-CAAFE para avaliar consumo alimentar, atividade física, comportamentos sedentários, modos de deslocamento para/da escola e o estado nutricional de uma amostra de 2.654 estudantes do segundo ao quinto ano do Ensino Fundamental de Feira de Santana, Bahia. Os achados mostraram que: 1) há sobreposição de comportamentos saudáveis e não saudáveis entre os participantes; 2) há marcantes diferenças de gênero nas atividades físicas; 3) um número expressivo de estudantes estava com sobrepeso/obesidade; 4) o uso de telas se associa ao consumo de alimentos não saudáveis; 5) a infraestrutura escolar para a prática de esportes, atividades físicas e de lazer, assim como a participação nas aulas de educação física, influenciam as atividades físicas e os comportamentos sedentários dos estudantes. Atualmente, a linha de pesquisa desenvolve estudo com comunidades Quilombolas da zona rural do município, cujos resultados esperados podem possibilitar conhecer os comportamentos de movimento dos estudantes dessas comunidades, estado nutricional, consumo alimentar e a adequação do cardápio da alimentação escolar às especificidades culturais das comunidades.

Palavras-Chave: Atividade Motora; Consumo Alimentar; Saúde da população negra; Internet; Saúde Pública.

Introduction

Population growth, the increase in life expectancy and the urbanization of cities, which occurred during the 20th century, led to behavioral changes that impacted the health of the population (NAHAS; GARCIA, 2010). Chronic diseases have become highly prevalent, especially cardiovascular diseases, and insufficient physical activity has gained recognition as an important cardiovascular risk factor (WHO, 2020) along with a dietary pattern characterized by low consumption of in natura foods and high *intake* of processed and ultra-processed foods (MONTEIRO *et al.*, 2018).

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Changes in the food system have been influenced by urbanization and globalization that have transformed the dominant source of food. The domestic food production or food manufactured by small producers (traditional food pattern) has been gradually replaced until reaching the current modern food system (ZOBEL et al., 2016), *characterized* by large productions, global negotiators, with more profit in the manufacture and distribution of increasingly processed foods (ZOBEL *et al.*, 2016) and attractive for consumption (MONTEIRO *et al.*, 2018).

This new food system influenced the increase in caloric intake between the 1970s and the 2000s, which became one of the reasons for the increase in average body weight of the population worldwide and, consequently, for the overweight and obesity epidemic (VANDEVIJVERE *et al.*, 2019). Added to changes in eating patterns, a change in ways of working, with routines predominantly in a sitting position, and commuting, based on the use of motorized transport, led to a reduction in daily energy expenditure, increasing the interest of researchers in this area on the impact of sedentary behaviors on the health of individuals (BIDDLE *et al.*, 2017).

In adults, research points to a positive relationship between sedentary behavior and cardiovascular disease, type 2 diabetes and metabolic syndrome (REZENDE *et al.*, 2014). People with a greater amount of sedentary behavior have an increased risk of health problems, early mortality (EKELUND *et al.*, 2016) and all-cause mortality (DE REZENDE *et al.*, 2014). In children, excess of this behavior is associated with increased adiposity, poor cardiometabolic health and unfavorable pro social behavior (WHO, 2020).

Additionally, the idea that insufficient physical activity creates a risk of disease, and that regular physical activity is good for one's health is not a contemporary creation. It has been empirically known for a long time that physical activity practiced "within certain limits" is beneficial for health, as proposed by Hippocrates, approximately 400 years BC (HOWLEY; FRANKS, 2000). However, the first evidence that gave a scientific property to this notion dates back to the early 1950s, of the last century (PEDIŠIĆ; DUMUID; OLDS, 2017).

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The second half of the 20th century was an important milestone for scientific research in the field of physical activity, when the pioneering studies of Dr. Jeremy Morris et al. showed that the general mortality rate of workers in more physically demanding activities was lower than that of workers in physically light occupational activities (MORRIS et al., 1953; MORRIS; HEADY, 1953; MORRIS; RAFFLE, 1954). These studies and others akin (AINSWORTH *et al.*, 2000; GUTHOLD *et* al., 2018; GUTHOLD *et al.*, 2020; HALLAL *et al.*, 2007; HALLAL *et al.*, 2010) helped to compose the field currently known as physical activity epidemiology.

The decades following the pioneer work of Morris and collaborators saw a broad growth of scientific production in the field of physical activity epidemiology, consolidating the beneficial effect of regular physical activity in the prevention and control of health problems such as diabetes, cardiovascular diseases, some cancers (GUTHOLD *et al.*, 2018), obesity, mental disorders (MALM; JAKOBSSON; ISAKSSON, 2019) and neurodegenerative diseases (HAMER; CHIDA, 2009).

In Brazil, scientific production on physical activity has grown substantially since the beginning of the 21st century, leveraged by the increase in the number of research groups, especially in public institutions of higher education. In 2012, 141 research groups on physical activity and health were identified in the country, 23.4% located in the Northeastern states (SANTOS *et al.*, 2016).

Despite this advance, the regional disparities in the number of scientific publications focusing on physical activity and its relationship with health outcomes identified in the first decade of the 2000s (HALLAL *et al.*, 2007) prevailed in the second (RAMIRES *et al.*, 2014). The Northeast region, responsible for hosting 11.0% of the publications on physical activity in 2007, started to contribute with 18.5% of the national scientific production in this field of study in 2014 (RAMIRES et al., 2014). In this context, the Nucleus of Studies and Research in Physical Activity and Health (*Núcleo de Estudos e Pesquisas em Atividade Física e Saúde* – NEPAFIS) was created in 2008 at the State University of Feira de Santana (*Universidade Estadual de Feira de Santana* – UEFS), Bahia, with the objective of investigating the relationship between the practice of physical activities and health in the semi-arid region of Bahia in topics

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such as food consumption, sedentary behavior and active modes of transport, with a focus on children and youth. The objective of this report is to describe the creation and consolidation process of the line of research "Food consumption, physical activity and sedentary behavior of children and adolescents" at NEPAFIS.

Development

Housed on the UEFS campus, in Feira de Santana, NEPAFIS is located at the largest road junction in North-Northeast Brazil and at a significantly strategic point of migratory convergence within the state of Bahia. Feira de Santana is the 33rd Brazilian city in terms of population and the most populous in the interior of Bahia, with 556,642 inhabitants censused in 2010 and an estimate of 624,107 for the year 2022 (IBGE, 2022).

NEPAFIS has been registered in the Directory of Research Groups in Brazil (dgp.cnpq.br/dgp/espelhogrupo/9939000778000291) since 2008, in the predominant areas of Health Sciences and Physical Education, with two lines of research: I- *Physical Education, Collective Health and Professional Training* and II- *Food consumption, physical activity and sedentary behavior of children and adolescents.* The research group currently comprises a team of 10 researchers, three with a PhD, one with a Master's, two Master's students and four undergraduate students involved in the institutional scientific initiation scholarship program.

Line of research II – 'Food consumption, physical activity and sedentary behavior of children and adolescents', the focus of the analyses performed in the current report, was initiated in 2014, with the research 'Digital monitoring of food consumption and physic activity habits of schoolchildren between 7 and 10 years of age', a project funded by the State of Bahia Research Support Foundation (*Fundação de Amparo à Pesquisa do Estado da Bahia* – FAPESB) (Edict 028/2012, Order N°. 1238/2013, Grant N°. PES0049/2013) and which had the aim of adapting and validating an online questionnaire to assess schoolchildren's food intake and physical activity (Web-CAAFE), so that it could be used as a health surveillance tool in the population of Feira de Santana. Taking into account the results of the Web-CAAFE validation

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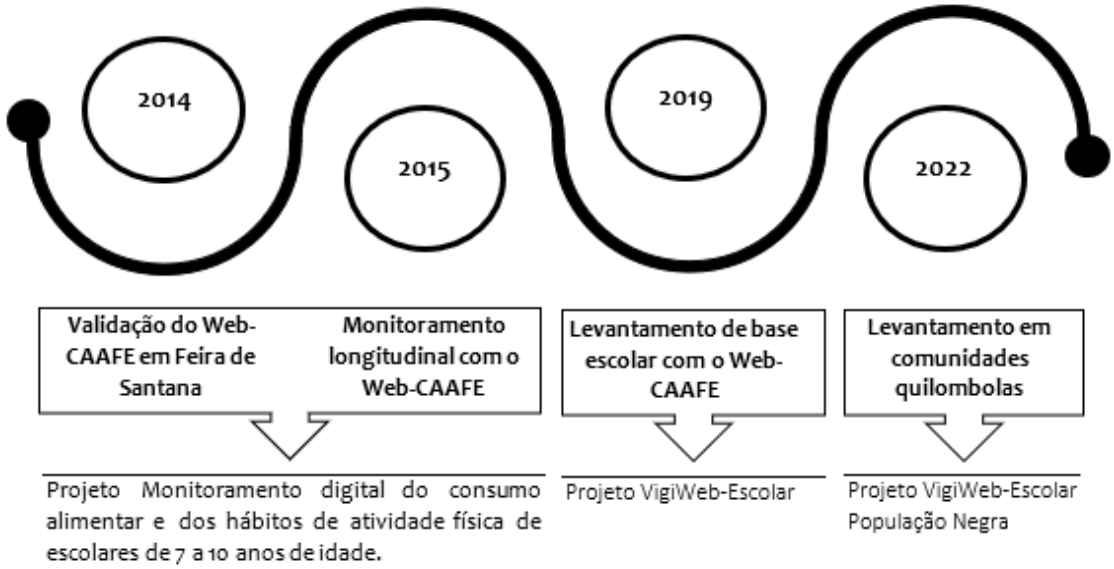
study, in 2019, NEPAFIS carried out the study 'Health surveillance of elementary school students via the VigiWeb-Escolar internet survey, a school-based survey, with a representative sample of more than 2,600 students from the second to the fifth year of Elementary School from schools in the urban area of Feira de Santana. In order to continue with the analyses carried out and to broaden the view on food consumption and physical activity in the age group studied, in 2022, the data collection phase of the survey 'Physical activity, food consumption and nutritional status of students in areas from remaining *quilombo* communities: *Projeto VigiWeb-Escolar População Negra'*, whose focus was directed to study children and adolescents from *quilombola* (maroon) schools, with FAPESB funding, Public Decree FAPESB nº 005/2012, Request nº 1238/2013, Grant nº PES0049/ 2013.

These projects and the scientific findings derived from the analysis of data on food consumption, physical activity, sedentary behavior, modes of transportation and nutritional status, provided the consolidation of line of research II within NEPAFIS.

Figure 1. Milestones in the creation and consolidation of line of research II within NEPAFIS.



Source: Center for Studies and Research in Physical Activity and Health.

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Project Digital monitoring of food consumption and physical activity habits of schoolchildren aged 7 to 10 years of age

This project started in 2014 and led to the creation of research line II - 'Food consumption, physical activity and sedentary behavior of children and adolescents' within NEPAFIS. The study was carried out with the participation of a convenience sample composed of 390 students from the second to the fifth year of elementary school at a public school in Feira de Santana and included longitudinal monitoring, through the Web-CAAFE, of food consumption, activities physical activity, sedentary behavior, modes of commuting to school and nutritional status during four occasions in the 2015 school year.

The validation study consisted of comparing data on food and drinking patterns, physical activity and sedentary behavior self-reported in the Web-CAAFE with data directly observed by the research team in the school environment, in the same reference period of the reports (previous day).

The project had the support of the Feira de Santana Municipal Department of Education and the scientific partnership of the Behavior and Food Consumption Laboratory of the Federal University of Santa Catarina, responsible for the development of the Web-CAAFE.

- Web-CAAFE

The Web-CAAFE questionnaire is a web browser software developed for school-based surveys, programmed using PHP5, HTML5, CSS3 and Java Script languages and in agreement with international quality standards (CMMI level II) to be compatible with different operating systems (Win /Linux/Mac OS). Two-dimensional images integrated into a larger scenario (sprites) were used, along with CSS programming and Java Script language management, in order to animate an avatar (*Cafito*) that assists in the filling. The user can access the questionnaire by logging in with a password created automatically by the system that is specific for each survey, school and time of day (morning or afternoon), to prevent the same respondent from completing the questionnaire more than once in the same session day.

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The formative research carried out in the process of developing the Web-CAAFE used diverse data sources, including: a) the experience with the validation studies carried out with the paper and pencil versions of the Previous Day Food Questionnaire (QUADA) (ASSIS et *al.*, 2009; DE ASSIS *et al.*, 2008) and the Previous Day Physical Activity Questionnaire (QUAFDA) (CABRAL; COSTA; LIPAROTTI, 2011); b) food consumption and physical activity data reported by students who participated in surveys using the QUADA and QUAFDA (ASSIS *et al.*, 2010; COSTA *et al.*, 2012); c) the web-based instruments developed for school-aged children in the international literature (BARANOWSKI *et al.*, 2002; DI NOIA; CONTENTO; SCHINKE, 2007; MCMURRAY *et al.*, 1998; MOORE *et al.*, 2008; RIDLEY; DOLLMAN; OLDS, 2001; RIDLEY; OLDS; HILL, 2006; TREMBLAY; WYATT INMAN; DOUGLAS WILLMS, 2001; VEREECKEN *et al.*, 2005; WELK *et al.*, 2001); d) data from focus groups conducted with Physical Education teachers (DA COSTA et al., 2013) and nutritionists (DAVIES *et al.*, 2015); e) data from a seven-day diary of consumed food and activities answered by 180 students from three schools; f) and the research team's discussions with a psychopedagogue to choose the questions and the Web layout according to the children's cognitive abilities. The main lessons learned in the formative research process indicated that the instrument should: 1) be as simple as possible, both in terms of quantity and quality of information required from the students, 2) be attractive and interactive, 3) include only relevant items to be marked by the children (DA COSTA *et al.*, 2013; DAVIES *et al.*, 2015).

Figure 2. Screens for reporting food consumption and physical activity in the Web-CAAFE.

Screen for reporting food consumption in Web-CAAFE.

Screen for reporting physical activities and sedentary behavior in the Web-CAAFE.

Source: Web-CAAFE: http://caafe.ufsc.br/portal/10/detalhes.

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The Web-CAAFE is an instrument for remembering a single day divided into three sections: a registration form (name, mother's name, sex, body mass, height, age, date of birth and school shift), a food consumption section (food and drinks consumed in six meals) and another of physical and sedentary activities (activities performed in the morning, afternoon and evening) which includes modes of displacement (passive and active).

- Web-CAAFE validation results in Feira de Santana

The research results were published in national and international scientific journals and presented at congresses. Based on the validation results, the Web-CAAFE proved to be an accurate and reliable tool to be used in the assessment of important health behaviors in pediatric populations, such as physical activity and food consumption (JESUS et al., 2016; *JESUS;* ASSIS; KUPEK, 2017). In addition, the questionnaire showed good consistency in the comparison between the measured and self-reported data of body mass and height, for the calculation of the Body Mass Index (BMI) and classification of nutritional status (JESUS et al., 2017).

- Screen use of and Consumption of Unhealthy Food

During the longitudinal monitoring carried out in 2015, it was possible to identify that daily screen exposure (≥3 screens/day) leads to a 45.0% consumption frequency of Unhealthy Foods (UF), such as sweets, candies, soft drinks, snacks and other processed and ultra-processed products. Cell phone, computer and video game use led to higher UF consumption, but TV use did not show any effect.

- Active Commuting and Physical Activity

In another analysis, the research showed that students who used the active commuting mode "pedaling" to and from school also exhibited a higher daily frequency of physical activity. Cycling to and from school helped children maintain a

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stable daily frequency of physical activity throughout the school year (DE JESUS *et al.*, 2021). In preliminary analyses (not yet published), contained in an article being evaluated by a scientific journal, we found that the Web-CAAFE presents good consistency (reproducibility) to evaluate the modes of commuting to school.

- Girls, Boys and the different types of Physical and Sedentary Activities

The data collected in the 2015 longitudinal monitoring also allowed for the analysis of differences in the physical and sedentary activities of girls and boys. In adolescence, women participate less in physical activities and sports than men, especially when they have low income and low education levels (PNUD, 2017). The overlapping of domestic and work tasks and social gender norms end up restricting women's participation in the same physical and sports activities as men (ALTMANN *et al.*, 2018; SPENCER; REHMAN; KIRK, 2015).

In our analysis, we described gender differences in the types of physical and sedentary activities practiced by girls and boys participating in the study. The results showed that, although girls reported more daily physical activity than boys, with a predominance of light and moderate activities, they reported participating more in household chores. Among boys, vigorous activities predominated, such as combat sports and soccer. On the other hand, between the girls and boys in the study, there was no difference in the daily frequency of involvement in sedentary behaviors, such as using screens and activities performed in a sitting position (JESUS et al., 2020).

- Obesity and decline in daily physical activity

Results of a longitudinal study show that participation in sports and regular structured exercise programs leads to a slower increase in Body Mass Index (BMI) or a decrease in its values during childhood (DUNTON et al., 2012). Other studies show that the association between the practice of structured sports and physical activities

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in leisure time and BMI can be bidirectional or even without effect (KELLEY et al., 2015). In our analyses, obesity occurred in 16.5% of the students and reduced the practice of vigorous physical activity by 20.0%, especially in the girls' group (JESUS *et al.*, 2021a).

- Physical Activities, Sedentary Behaviors and the Seasons

The seasonal variation of physical activities and sedentary behaviors, that is, how these behaviors occur throughout the seasons of the year, was also the focus of one of the analysis of data from this research. We observed that the winter period favored the practice of light physical activities and, at the same time, the adoption of sedentary behaviors, but restricted the practice of vigorous activities, especially among girls. In addition, adolescents (10 to 12 years old) exhibited more sedentary behaviors than children (7 to 9 years old), especially in autumn and early spring (JESUS et al., 2021b).

- Missing Class Also Contributes to Excessive Sedentary Behaviors

Although sedentary behaviors predominate in the school shift because students spend most of their time seated, our hypothesis was that, even in this context, school routine and rules could keep the child away from excessive time in front of screens, such as cell phones, TVs, computers, tablets and videogames. In fact, our results showed that, throughout the 2015 school year, the daily frequency of screen use was 13.0% higher among students exactly on the days they missed class, and this tended to be recurrent throughout the school year, especially during the winter (JESUS *et al.*, 2022).

In general, the results of the validation of the Web-CAAFE, in Feira de Santana-BA, reinforced the findings of the first validity studies of the instrument, carried out in Florianópolis (SC), and contributed to the consolidation of this tool in the surveillance of those important behaviors involved on the health of children and

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adolescents that are food consumption and physical activity. A decade after the development of the Web-CAAFE and the first studies evaluating its psychometric qualities, the use of the instrument has grown in several research centers in different states of the country, such as Santa Catarina, Bahia, São Paulo, Tocantins, Minas Gerais, Rio de Janeiro, Sergipe and Pará. On the horizon is the hope that the Web-CAAFE could be widely used as a tool to support the development of intervention strategies and even public policies to promote healthy eating and physical activity aimed at Brazilian children.

Project Health surveillance of elementary school students via Internet survey: VigiWeb-Escolar

The *VigiWeb-Escolar* project started in 2018, with data collection carried out from March to October 2019. The study included a school-based sample, consisting of 2,654 students from the second to the fifth year of 11 public schools in the urban area of Feira de Santana. The objective was to create a surveillance system for health aspects of schoolchildren, in partnership with the Health at School Program, focusing on food consumption, physical activity, sedentary behavior, modes of commuting to school and nutritional status, using the Web-CAAFE as a data collection tool. The research did not have funding from any research funding agency, but it had the support of UEFS, the Municipal Secretary of Education and the Municipal Secretary of Health of Feira de Santana. In addition, it used the equipment and materials acquired by the Digital Monitoring Project of food consumption and physical activity habits of schoolchildren aged 7 to 10 years.

The data collection process had the voluntary help of students and professionals in physical education and nutrition, in addition to the NEPAFIS research team. All underwent training to measure weight and height and familiarize themselves with the procedures for applying the online questionnaire. The study also collected socioeconomic information and characteristics of the environment built at

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the school (through a questionnaire applied to the principals) and in the neighborhood (data obtained from administrative sectors of the municipal government). Until now, the analyzed data enabled the production of a doctoral thesis (DIAS, 2022), a master's dissertation (BARROS, 2022), an undergraduate monograph (SILVA, 2021) and a scientific article (JESUS et *al.*, 2022).

In general, the findings showed that there is an overlap of healthy and unhealthy behaviors among the participants, marked gender differences in physical activities, a significant number of overweight/obese students and that screen use is associated with unhealthy food consumption. In addition, it was observed that the school infrastructure for the practice of sports, physical and leisure activities, as well as participation in physical education classes, can influence the students' physical activities and sedentary behavior.

- Different patterns of movement behaviors between boys and girls

Using a person-centered analysis method, different groups of movement behaviors were identified among the study participants, that is, different patterns of physical activity and sedentary behavior. Two patterns were evidenced among girls and three patterns among boys. Higher daily scores of physical activities and greater involvement with sports were observed among boys, while active play and household chores had a greater contribution to the formation of patterns observed among girls. Despite these differences, children and adolescents with a higher weekly frequency of participation in Physical Education classes, regardless of gender, were more likely to belong to the more active behavior patterns (DIAS, 2022).

- Patterns of movement behaviors and overweight and obesity

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The assessment of the participants' nutritional status showed that 14.0% of the girls and 12.2% of the boys were overweight and that 7.0% and 5.9% were obese, respectively. Boys and girls classified within the less physically active movement behavior patterns tended to be more overweight and obese (DIAS, 2022). These findings reinforce that patterns of obesogenic behavior are complex and that they usually consist of a mixed cluster, with healthy and unhealthy behaviors (LEECH; MCNAUGHTON; TIMPERIO, 2014), which makes the impact on the child's body weight imprecise.

- Built environment for physical, sporting and leisure activities at school and in the neighborhood and patterns of physical activity and sedentary behavior

The context in which people are inserted can determine individual choices (STAPPERS *et al.*, 2018) and the natural environment and the built environment are configured as determinants of physical activity and sedentary behaviors (BAUMAN et al., 2012). In this sense, the influence of the built environment at school and in the neighborhood on the patterns of physical activity and sedentary behavior of children and adolescents was also the focus of analysis in the current study. It was observed that most schools provided materials for Physical Activity (PA) at recess, allowed active play in covered spaces (72.7%), however, they did not have a playground (63.6%) and did not develop programs in the area of physical activity/sports (72.7%). The most frequent facilities favorable to the practice of PA in the neighborhoods were public squares, followed by sports courts and soccer fields. Interestingly, the more active patterns among girls (active players) and boys (practitioners of active play and structured physical activity) were less likely to study in schools with a greater possibility of PA in indoor spaces (DIAS, 2022). Some factors can change the effect of the school-built environment on physical activity and sedentary behavior, such as the dimensions of the free area, the rules for using the space and the types of physical activities typically performed in covered spaces.

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- Exposure to different types of screens and consumption of unhealthy foods

The association between the use of screens and the consumption of Unhealthy Foods (UF) among schoolchildren is already well described in the literature, especially among adolescents (ASHDOWN-FRANKS et al., 2019; COSTA et al., 2018) *and* the *effect* of advertisements on TV, encouraging the consumption of these foods (RUSSELL; CROKER; VINER, 2019), has been accepted as a plausible explanation for the phenomenon. Although this association seems to be well established in the literature, the VigiWeb-Escolar project innovated the way of assessing screen exposure, analyzing the effect of different types of screens, regardless of exposure time. In general and with adjustment for age, BMI z-score and daily frequency of physical activity, it was possible to verify that students exposed to any screen (that is, when considering the daily sum of the number of screens that the participants reported using) exhibited, on average, 20.0% higher UF consumption. Students exposed to the use of a cell phone screen (PR=1.21; 95%CI: 1.13-1.30), video games (PR= 1.36; 95%CI:1.22-1.52) and computer (PR =1.33; 95%CI: 1.22-1.46) exhibited higher UF consumption, but exposure to the TV screen (PR=0.92; 95%CI:0.87-0.99) was inversely associated with UF consumption. In addition, a higher daily frequency of PA (≥4 PA/day), although attenuating the effect of video game exposure on UF consumption, was not able to nullify it (BARROS, 2022).

- Economic level and physical activities and sedentary behaviors

The analysis of a subsample of participants in the VigiWeb-Escolar project (n = 959) made it possible to identify the association between economic level and daily frequencies of sedentary behaviors and physical activities, grouped into types. Physical activities were grouped into active games, non-active games, housework, combat sports and ballet. Sedentary behaviors were grouped into academic activities and sedentary behaviors based on screen use. The results of the regression models adjusted for age, sex and school shift showed that the economic level was not associated with physical activities (PR=1.02; 95%CI=0.92-1.12) or daily sedentary

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behaviors (PR=1.0; CI95%=0.91-1.11) (SILVA, 2021). This result may be due to the type of school included in the sample (public), which has students who do not differ substantially from each other in terms of socioeconomic status, a point that deserves to be deepened in subsequent studies.

The physical activity, food consumption and nutritional status of students in areas of remaining quilombo communities project: *VigiWeb-Escolar População Negra*

The *VigiWeb-Escolar População Negra* (School *VigiWeb* Black population) project is funded by FAPESB (Edital nº005/2019, Request 5809/2019, Grant nº PET0004/2021), with data collection in the field starting in the year 2022. The study aims to analyze physical activity, food consumption and nutritional status of children and adolescents in public schools in areas of remaining *quilombo* communities, located in the rural area of Feira de Santana.

According to data from the Feira de Santana Municipal Department of Education, the city has 210 schools in the municipal education network, among which 169 offer vacancies in the first cycles of Elementary Education. 20 of these schools are located in areas of remaining quilombo communities, and 17 of those 20 scholls are in the rural zone, distributed among the districts Mária Quitéria (n = 05), Matinha (n = 04), Humildes (n=02), Jaguara (n = 02), = 02) and Bonfim de Feira (n = 04). In all, the 2,138 students from the second to the fifth year of elementary school, enrolled in these schools in the 2022 school year, made up the eligible population for the study. The calculated simple random sample was n = 712 individuals. When correcting for the effect of the cluster design (*deff* = 1.5) and with the addition of 20.0% to compensate for any losses, the calculated sample size was n = 1,282 participants.

Based on the desired sample size, cluster sampling was carried out in four stages: I) eligible schools were stratified according to districts in the rural area (clusters); II) the number of students enrolled in the schools of each cluster was added; III) the proportional weight of the number of enrollments of each school

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within its cluster was calculated, to define the desired sample in each school unit, multiplying the proportional weight by the calculated sample size; IV) classes from 2nd to 5th grade within each school were selected and all students were invited to participate.

The procedures for starting the collection began in March and included training the research team to carry out anthropometric measurements and apply the Web-CAAFE. The team is currently in the field, collecting data. According to the research schedule, the forecast is to end the collection in all districts in November. The project also has the support of the Feira de Santana Municipal Department of Education and the scientific partnership of the Food Consumption Behavior Laboratory of the Federal University of Santa Catarina.

The transformations resulting from the Covid-19 pandemic influenced the adoption of risk control measures during data collection, such as the use of masks by the research team, proof of immunization with the vaccine against Covid-19, including booster doses, constant cleaning of the equipment for measuring weight and height, as well as the headphones, mouse and keyboards of the laptops used for reporting on the Web-CAAFE.

It is noteworthy that although the project was approved for funding in 2019, with the first installment of the approved amount being made available in 2020, the stages of the study schedule only started in 2022. To start the research activities, the following aspects were considered: advancement of vaccination coverage against Covid-19 in the country, attenuation of the disease's incidence and mortality curves and relaxation of measures to mitigate the SARS-CoV-2 virus – such as the opening of public schools and authorization to carry out in person activities on the university campus.

In addition, in this time window between 2019 and 2022, there was a change in the municipal management of education in Feira de Santana, which led to the need to obtain a new authorization term to carry out the study. The first face-to-face contact with the participating schools was also challenging, taking into account that

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the field activities began during the autumn, a season marked by the beginning of the highest incidence of rainfall in the city, which made it even more difficult for the team to travel, as all the schools are located in the rural area, with access via unpaved roads, many potholes and puddles of accumulated rainwater.

Another important factor to be considered is that the telephone and internet networks in rural schools create additional difficulties for communication and the application of the Web-CAAFE. The spaces available for assembling the equipment and administering the questionnaire have also been a limiting factor in the research, taking into account that schools do not have computerized rooms. Thus, sometimes the data collection station is set up in environments with a lot of movement of people and noise from students in other classes. This can negatively impact children's attention span, which is so necessary to complete questionnaire information accurately.

Final considerations

The studies carried out using the Web-CAAFE in Feira de Santana have already made it possible to achieve important results for understanding the health of public-school students. However, some financial, structural and contextual difficulties were seen as challenges to be overcome to guarantee the realization of the studies. The lack of funding in 2019 made it difficult to purchase equipment, transport and food costs for the research team, who mostly worked voluntarily and with their own resources. Structural aspects such as the lack of rooms for computer classes and the instability of the internet signal in some schools required the team to be able to adapt spaces such as libraries, laboratories and sports courts for the installation of equipment and to relocate classes and students to other collection shifts when the school internet was not working normally, or even hire internet services for the school.

Problems in completing the questionnaires observed in children who did not complete the literacy process at the appropriate age/grade (with reading and writing difficulties) or who never used a computer, in addition to the low adherence of

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parents in completing the forms sent home, turned the data collection process slower at times and caused socioeconomic aspects not to be used in some data analyses.

In schools located in rural areas, other obstacles have been faced in the organization and execution of data collection. These schools have a different scenario from schools in the urban area, with shorter class shifts, due to the time required for students and teachers to travel to school, and a smaller supply of reserve teachers, which sometimes causes the suspension of classes. The observed realities and difficulties encountered challenge the team of researchers in the context of carrying out the research and in the elaboration of strategies to overcome the identified problems.

However, the lessons learned with the use of Web-CAAFE in monitoring aspects of the students' health and with the validation studies allowed us to identify the need for some improvements to be made in the tool, such as: a) the inclusion of a question related to race/color of the child, as this is an important factor in addressing the social determinants of physical activity, sedentary behavior and food consumption; b) include screens in the Web-CAAFE for reporting the activities carried out in the physical education class and at recess; c) adapt the instrument for use in other electronic devices such as cell phones and tablets, in order to provide greater practicality in completing it; d) and increase the number of icons for reporting food, physical and sedentary activities, in order to allow greater adaptation to the local culture of the different Brazilian states. In addition, the experience gained from the studies made us recognize the need to develop other strategies to assess the economic level of students, such as using questions about food insecurity, including sleep assessment, another important aspect that influences the child's health, and implement a monitoring program incorporating the application of the Web-CAAFE in the calendar of activities of all schools in the municipality, with support from the Municipal Secretary of Education, for longitudinal assessment of the student' health.

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Finally, it is important to highlight that consolidating the Web-CAAFE as a tool for monitoring the students' health reinforces the importance of evaluating physical activities and sedentary behaviors based on the types of activities, and not on frequency or intensity. An approach centered on these behaviors can contribute to the development and implementation of strategies for health promotion in childhood and adolescence, as this information is easier for the general public to understand.

References

AINSWORTH, B. E. et al. Compendium of physical activities: an update of activity codes and MET intensities. **Medicine and science in sports and exercise**, v. 32, n. 9, suppl.1, p.s498-S504, 2000. https://doi.org/10.1097/00005768-200009001-00009

ALTMANN, H. et al. Gênero e cultura corporal de movimento: práticas e percepções de meninas e meninos. **Revista Estudos Feministas**, v. 26, n. 1, p. e44074, 2018. https://doi.org/10.1590/1806-9584.2018v26n144074

ASHDOWN-FRANKS, G. et al. Association of leisure-time sedentary behavior with fast food and carbonated soft drink consumption among 133,555 adolescents aged 12–15 years in 44 low- and middle-income countries. **International Journal of Behavioral Nutrition and Physical Activity**, v. 16, n. 1, 2019. https://doi.org/10.1186/s12966-019-0796-3

ASSIS, M. A. A. DE et al. Validação da terceira versão do Questionário Alimentar do Dia Anterior (QUADA-3) para escolares de 6 a 11 anos. **Cadernos de Saúde Pública**, v. 25, n. 8, p. 1816–1826, 2009. https://doi.org/10.1590/S0102-311X2009000800018

ASSIS, M. A. A. DE et al. Qualitative analysis of the diet of a probabilistic sample of schoolchildren from Florianópolis, Santa Catarina State, Brazil, using the Previous Day Food Questionnaire. **Cadernos de Saúde Pública**, v. 26, n. 7, p. 1355–1365, 2010. https://doi.org/10.1590/S0102-311X2010000700014

BARANOWSKI, T. et al. The Food Intake Recording Software System is Valid Among Fourth-grade Children. **Journal of the American Dietetic Association**, v. 102, n. 3, p. 380–385, 2002. https://doi.org/10.1016/s0002-8223(02)90088-x

BARROS, A. K. C. **Uso de telas e o consumo de alimentos não saudáveis: Estudo transversal**. Dissertação (Mestrado Acadêmico em Saúde Coletiva) — Programa de Pós- Graduação em Saúde Coletiva, Universidade Estadual de Feira de Santana: Universidade Estadual de Feira de Santana, 2022.

BAUMAN, A. E. et al. Correlates of physical activity: why are some people physically active and others not? **The Lancet**, v.380, n.9838, p.258–271, 2012. https://doi.org/10.1016/S0140-6736(12)60735-1

BIDDLE, S. et al. Screen Time, Other Sedentary Behaviours, and Obesity Risk in Adults: A Review of Reviews. **Current obesity reports**, v. 6, n. 2, p. 134–147, 2017. https://doi.org/10.1007/s13679-017-0256-9

CABRAL, L. G. DE A.; COSTA, F. F. DA; LIPAROTTI, J. R. Evidências preliminares de validade da seção de atividade física do Questionário de Atividade Física e Alimentação do Dia Anterior (QUAFDA). **Revista brasileira de atividade física e saúde**, v. 16, n. 2, p. 100-106, 2011. https://doi.org/10.12820/rbafs.v.16n2p100-106

COSTA, C. DOS S. et al. Comportamento sedentário e consumo de alimentos ultraprocessados entre adolescentes brasileiros: Pesquisa Nacional de Saúde do Escolar (PeNSE), 2015. **Cadernos de Saúde Pública**, v. 34, n. 3, p. e00021017, 2018. https://doi.org/10.1590/0102-311X00021017

COSTA, F. F. DA et al. Mudanças no consumo alimentar e atividade física de escolares de Florianópolis, SC, 2002 - 2007. **Revista de Saúde Pública**, v. 46, suppl. 1, p.117–125, 2012. https://doi.org/10.1590/S0034-89102012005000058

DA COSTA, F. F. et al. Assessment of diet and physical activity of brazilian schoolchildren: usability testing of a web-based questionnaire. **JMIR research protocols**, v. 2, n. 2, 2013. https://doi.org/10.2196/resprot.2646

DAVIES, V. F. et al. Qualitative analysis of the contributions of nutritionists to the development of an online instrument for monitoring the food intake of schoolchildren. **Journal of Human Nutrition and Dietetics**, v. 28, p. 65–72, 2015. https://doi.org/10.1111/jhn.12209

DE ASSIS, M. A. A. et al. Test–retest reliability and external validity of the previous day food questionnaire for 7–10-year-old school children. **Appetite**, v. 51, n. 1, p. 187–193, 2008. https://doi.org/10.1016/j.appet.2008.02.014

DE JESUS, G. M. et al. Influence of active commuting to school on daily physical activity among children and adolescents. **Journal of Transport & Health**, v. 21, p. 101071, 2021. https://doi.org/10.1016/j.jth.2021.101071

DE REZENDE, L. F. et al. Sedentary behavior and health outcomes: an overview of systematic reviews. **PloS one**, v. 9, n. 8, p. e10562, 2014. https://doi.org/10.1371/journal.pone.0105620

DI NOIA, J.; CONTENTO, I. R.; SCHINKE, S. P. Criterion Validity of the Healthy Eating Self-Monitoring Tool (HEST) for Black Adolescents. **Journal of the American Dietetic Association**, v. 107, n. 2, p. 321–324, 2007. https://doi.org/10.1016/j.jada.2006.11.015

DIAS, L. A. **Padrões de atividades físicas e comportamentos sedentários de escolares do 2º ao 5º ano do Ensino Fundamental**. Tese (Doutorado em Saúde Coletiva) — Feira de Santana: Programa de Pós- Graduação em Saúde Coletiva, Universidade Estadual de Feira de Santana, 2022.

DUNTON, G. et al. Organized physical activity in young school children and subsequent 4-year change in body mass index. **Archives of pediatrics & adolescent medicine**, v. 166, n. 8, p. 713–718, 2012. https://doi.org/10.1001/archpediatrics.2012.20

EKELUND, U. et al. Does physical activity attenuate, or even eliminate, the detrimental association of sitting time with mortality? A harmonised meta-analysis of data from more than 1 million men and women. **Lancet (London, England)**, v. 388, n. 10051, p. 1302–1310, 2016. https://doi.org/10.1016/S0140-6736(16)30370-1

GUTHOLD, R. et al. Worldwide trends in insufficient physical activity from 2001 to 2016: a pooled analysis of 358 population-based surveys with 1·9 million participants. **The Lancet Global Health**, v. 6, n. 10, p. e1077–e1086, 2018. https://doi.org/10.1016/S2214-109X(18)30357-7

GUTHOLD, R. et al. Global trends in insufficient physical activity among adolescents: a pooled analysis of 298 population-based surveys with 1·6 million participants. **The Lancet Child & Adolescent Health**, v. 4, n. 1, p. 23–35, 2020. https://doi.org/10.1016/S2352-4642(19)30323-2

HALLAL, P. C. et al. Evolução da pesquisa epidemiológica em atividade física no Brasil: revisão sistemática. **Revista de Saúde Pública**, v. 41, n. 3, p. 453–460, 2007. https://doi.org/10.1590/S0034-89102007000300018

HALLAL, P. C. et al. Lessons learned after 10 years of IPAQ use in Brazil and Colombia. **Journal of physical activity & health**, n. 7, suppl. 2, p. s259–S264, 2010. https://doi.org/10.1123/jpah.7.s2.s259

HAMER, M.; CHIDA, Y. Physical activity and risk of neurodegenerative disease: a systematic review of prospective evidence. **Psychological medicine**, n. 39, v. 1, p. 3–11, 2009. https://doi.org/10.1017/S0033291708003681

HOWLEY, E. T.; FRANKS, B. D**. Manual do instrutor de condicionamento físico para a saúde**. 3a ed. Porto Alegre: Artes Médicas Sul; 2000.

IBGE - INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA. **População estimada**, 2022. Disponível em: https://cidades.ibge.gov.br/brasil/ba/feira-de-santana/panorama Acesso em 2 ago. 2022.

JESUS, G. M. DE et al. Avaliação da atividade física de escolares com um questionário via internet. **Revista Brasileira de Medicina do Esporte**, v. 22, n. 4, p. 261–266, 2016. https://doi.org/10.1590/1517-869220162204157067

JESUS, G. M. DE et al. Avaliação da consistência de valores de peso, altura e índice de massa corporal no questionário Consumo Alimentar e Atividade Física de Escolares: o controle da qualidade da entrada de dados no sistema. **Revista Brasileira de Epidemiologia**, v. 20, n. 4, p. 573–585, 2017. https://doi.org/10.1590/1980-5497201700040002

JESUS, G. M. DE et al. Diferenças de gênero na avaliação qualitativa de atividades físicas e sedentárias de escolares de 7 a 10 anos no nordeste brasileiro. **Revista Brasileira de Ciências do Esporte**, v. 42, n. e2013, 2020. https://doi.org/10.1016/j.rbce.2018.11.002

JESUS, G. M. DE et al. Obesity and decrease of daily physical activity among children and adolescents: a follow-up study. **Revista Brasileira de Cineantropometria & Desempenho Humano**, v. 23, n.e 78251, 2021a. https://doi.org/10.1590/1980-0037.2021v23e78251

JESUS, G. M. DE et al. Variação sazonal das atividades físicas e sedentárias de estudantes no semiárido baiano. **Revista Brasileira de Atividade Física & Saúde**, v. 26, p. 1–8, 2021b. https://doi.org/ 10.12820/rbafs.26e0185

JESUS, G. M. DE et al. Missing class increases the daily frequency of screen use among schoolchildren. **Revista Brasileira de Atividade Física & Saúde**, v. 27, p. 1–8, 2022. https://doi.org/ 10.12820/rbafs.27e0256

JESUS, G. M. DE; ASSIS, M. A. A. DE; KUPEK, E. Validade e reprodutibilidade de questionário baseado na Internet (Web-CAAFE) para avaliação do consumo alimentar de escolares de 7 a 15 anos. **Cadernos de Saúde Pública**, v. 33, n. 5, p. e00163016, 2017. https://doi.org/10.1590/0102-311X00163016

KELLEY, G. A.; KELLEY, K. S.; PATE, R. R. Exercise and BMI in overweight and obese children and adolescents: a systematic review and trial sequential meta-analyses. **BioMed Research International,** v. 2015, n. Special, p. 704539, 2015. https://doi.org/10.1155/2015/704539

LEECH, R. M.; MCNAUGHTON, S. A.; TIMPERIO, A. The clustering of diet, physical activity and sedentary behavior in children and adolescents: a review. **The International Journal of Behavioral Nutrition and Physical Activity**, v. 11, p. 4, 2014. https://doi.org/10.1186/1479-5868-11-4

MALM, C.; JAKOBSSON, J.; ISAKSSON, A. Physical Activity and Sports—Real Health Benefits: A Review with Insight into the Public Health of Sweden. **Sports,** n.7, v.5, p.127, 2019. https://doi.org/10.3390/sports7050127

MCMURRAY, R. G. et al. Comparison of a computerized physical activity recall with a triaxial motion sensor in middle-school youth. **Medicine& Science in Sports & Exercise**, v. 30, n. 8, p. 1238–1245, 1998. Disponível em: http://journals.lww.com/00005768-199808000-00009 Acesso em 12 ago. 2022.

MONTEIRO, C. A. et al. The UN Decade of Nutrition, the NOVA food classification and the trouble with ultra-processing. **Public Health Nutrition**, v. 21, n. 1, p. 5–17, 2018. https://doi:10.1017/S1368980017000234

MOORE, H. J. et al. The development and evaluation of a novel computer program to assess previous-day dietary and physical activity behaviours in school children: The Synchronised Nutrition and Activity Program ™ (SNAP ™). **British Journal of Nutrition**, v. 99, n. 6, p. 1266–1274, 2008. Disponível em: https://www.cambridge.org/core/product/identifier/S0007114507862428/type/journal_article Acesso em 12 ago 2022.

MORRIS, J. N. et al. Coronary heart-disease and physical activity of work. **The Lancet**, v. 262, n. 6795, p. 1053–1057, 1953. https://doi.org/10.1136/bmj.2.5111.1485

MORRIS, J. N.; HEADY, J. A. Mortality in Relation to the Physical Activity of Work: A Preliminary Note on Experience in Middle Age. **Occupational and Environmental Medicine**, v. 10, n. 4, p. 245–254, 1953. https://doi.org/10.1136/oem.10.4.245

MORRIS, J. N.; RAFFLE, P. A. B. Coronary Heart Disease in Transport Workers. A Progress Report. **Occupational and Environmental Medicine**, v. 11, n. 4, p. 260–264, 1954. https://doi.org/10.1136/oem.11.4.260

NAHAS, M. V.; GARCIA, L. M. T. Um pouco de história, desenvolvimentos recentes e perspectivas para a pesquisa em atividade física e saúde no Brasil. **Revista Brasileira de Educação Física e Esporte**, v. 24, n. 1, p. 135–148, 2010. https://doi.org/10.1590/S1807-55092010000100012

PEDIŠIĆ, Ž.; DUMUID, D.; OLDS, T. S. Integrating sleep, sedentary behaviour, and physical activity research in the emerging field of time-use epidemiology: definitions, concepts, statistical methods, theoretical framework, and future directions. **Kinesiology**, v. 49, n. 2, p. 252–269, 2017. Disponível em: https://hrcak.srce.hr/ojs/index.php/kinesiology/article/view/5401 Acesso em 28 out. 2022.

PROGRAMA DAS NAÇÕES UNIDAS PARA O DESENVOLVIMENTO (PNUD). **Relatório de Desenvolvimento Humano Nacional** - Movimento é Vida: Atividades Físicas e Esportivas para Todas as Pessoas: 2017. Brasília, 2017. Disponível em: http://www.each.usp.br/gepaf/wp-content/uploads/2017/10/PNUD_RNDH_completo.pdf Acesso em 28 out. 2022.

RAMIRES, V. et al. Evolução da pesquisa epidemiológica em atividade física e comportamento sedentário no Brasil: atualização de uma revisão sistemática. **Revista Brasileira de Atividade Física & Saúde**, v. 19, n. 5, 2014. Disponível em: http://periodicos.ufpel.edu.br/ojs2/index.php/RBAFS/article/view/3732 Acesso em 12 ago. 2022.

RIDLEY, K.; DOLLMAN, J.; OLDS, T. Development and Validation of a Computer Delivered Physical Activity Questionnaire (CDPAQ) for Children. **Pediatric Exercise Science**, v. 13, n. 1, p. 35–46, 2001. Disponível em: https://journals.humankinetics.com/view/journals/pes/13/1/article-p35.xml Acesso em 12 ago. 2022

RIDLEY, K.; OLDS, T. S.; HILL, A. The Multimedia activity recall for children and adolescents (MARCA): development and evaluation. **International Journal of Behavioral Nutrition and Physical Activity**, v. 3, n. 1, p. 10, 2006. https://doi.org/10.1186/1479-5868-3-10

RUSSELL, S. J.; CROKER, H.; VINER, R. M. The effect of screen advertising on children's dietary intake: A systematic review and meta-analysis. **Obesity Reviews**, v. 20, n. 4, p. 554–568, 2019. https://doi.org/10.1111/obr.12812

SANTOS, A. et al. Distribuição, evolução e produção científica dos grupos de pesquisa em atividade física e saúde do Brasil. **Revista Brasileira de Atividade Física & Saúde**, v. 17, n. 4, p. 258–262, 2016. Disponível em: https://rbafs.emnuvens.com.br/RBAFS/article/view/1874 Acesso em 01 ago. 2022.

SILVA, J. E S. **Nível econômico, comportamentos sedentários e atividades físicas de estudantes do segundo ao quinto ano em Feira de Santana, Bahia.** Trabalho de Conclusão de Curso (Graduação em Licenciatura em Educação Física) — Feira de Santana: Curso de Licenciatura em Educação Física, Universidade Estadual de Feira de Santana, 2021.

SPENCER, R. A.; REHMAN, L.; KIRK, S. F. Understanding gender norms, nutrition, and physical activity in adolescent girls: a scoping review. **International Journal of Behaviour Nutrition and Physical Activity**, v. 12, n. 6, 2015. https://doi:10.1186/s12966-015-0166

STAPPERS, N. E. H. et al. The effect of infrastructural changes in the built environment on physical activity, active transportation and sedentary behavior – A systematic review. **Health & Place**, v. 53, p. 135–149, 2018. Disponível em: https://linkinghub.elsevier.com/retrieve/pii/S1353829217311504 Acesso em 01 ago. 2022.

TREMBLAY, M. S.; WYATT INMAN, J.; DOUGLAS WILLMS, J. Preliminary evaluation of a video questionnaire to assess activity levels of children: **Medicine & Science in Sports & Exercise**, v. 33, n. 12, p. 2139–2144, 2001. Disponível em: http://journals.lww.com/00005768-200112000-00025 Acesso em 01 ago. 2022.

VANDEVIJVERE, S. et al. *Global trends in ultraprocessed food and drink product sales and their association with adult body mass index trajectories*. **Obesity Reviews: An Official Journal of the International Association for the Study of Obesity**, v. 20, suppl. 2, p. 10–19, 2019. https://doi.org/10.1111/obr.12860

VEREECKEN, C. A. et al. *Young adolescents' nutrition assessment on computer* (YANA-C). **European Journal of Clinical Nutrition**, v. 59, n. 5, p. 658–667, 2005. Disponível em: https://www.nature.com/articles/1602124 Acesso em 01 ago. 2022.

WELK, G. J. et al. Convergent validity of the previous day physical activity recall and the activitygram assessment. **Medicine & Science in Sports & Exercise**, v. 33, n. 5, p. s144,2001. Disponível em: http://journals.lww.com/00005768-200105001-00817 Acesso em 01 ago. 2022.

WHO – WORLD HEALTH ORGANIZATION**. Guidelines on physical activity and sedentary behaviour**. Geneva: World Health Organization; 2020. Disponível em: https://www.who.int/publications/i/item/9789240015128 Acesso em 01 ago 2022.

ZOBEL, E. H. et al. Global Changes in Food Supply and the Obesity Epidemic. **Current Obesity Reports**, v. 5, n. 4, p. 449–455, 2016. https://doi:10.1007/s13679-016-0233-8