



PRACTICE OF PHYSICAL ACTIVITY AND SPORTS IN BRAZIL

Práticas de atividade física e esporte no Brasil

Prácticas de actividad física y deporte en Brasil

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ABSTRACT

Objective: To characterize the individuals who practice sports and physical activity in Brazil by stratifying the results of the 2015 National Household Sample Survey. **Methods:** This is an ecological descriptive study off national secondary data from the 2015 National Household Sample Survey conducted with 71,142 people of 151,189 households from all the Units of the Federation. Descriptive statistical analysis was performed, and the data were organized in tables and graphs using the chi-squared test with $p \leq 0.05$. **Results:** The Federal District is the state with the highest rate of physical activity in the country (30.9%) and Mato Grosso is the state with the lowest rate (8.4%). As for sports, Alagoas is the state with the lowest rate of sports practice (17%) and Amazonas the state with the highest rate (30.7%). There was also a positive relationship between the practice of physical activity and sports and per capita income per household, thus showing that the higher the income, the higher the rate of practice of these activities. With regard to marital status, self-reported single individuals were the ones who practiced both modalities the most (sports 27% and physical activity 18%), with significant differences. **Conclusion:** The individuals who practiced sports and physical activity in Brazil in the year 2015 were mostly men, single, presented higher levels of education and income, and sought these activities in order to improve their quality of life and well-being.

Descriptors: Motor Activity; Exercise; Physical Exertion.

RESUMO

Objetivo: Caracterizar os praticantes de esporte e atividade físicas no Brasil por meio da estratificação dos resultados da Pesquisa Nacional de Amostra por Domicílio. **Métodos:** Trata-se de estudo ecológico de análise estatística descritiva, realizada com dados secundários em nível nacional por meio da Pesquisa Nacional de Amostra por Domicílio do ano de 2015, com 71.142 mil pessoas de 151.189 mil unidades domiciliares distribuídas por todas as Unidades da Federação. Realizou-se análise estatística descritiva, sendo organizadas variáveis qualitativas em tabelas e gráficos, através do teste qui-quadrado, considerando $p \leq 0,05$. **Resultados:** Constatou-se o Distrito Federal como o estado que mais realiza atividade física no país (30,9%) e o Mato Grosso o que menos realizou no período estudado (8,4%). Em relação ao esporte, Alagoas encontra-se como o estado que menos praticou esporte (17%) e o Amazonas o que mais o fez (30,7%). Percebeu-se ainda uma relação positiva entre a prática de atividade física e do esporte e a renda per capita por domicílio evidenciando que, quanto maior a renda, maior a prática dessas atividades. Quanto ao estado civil, nota-se que os autodenominados solteiros são os que mais praticam ambas as modalidades (esporte 27% e atividade física 18%), com diferenças significativas. **Conclusão:** Os praticantes de esporte e atividade física no Brasil no ano de 2015 caracterizam-se por serem do sexo masculino, com maior nível de escolaridade e renda, solteiros e que buscavam essas atividades a fim de melhorar sua qualidade de vida e o bem-estar.

Descritores: Atividade Motora; Exercício; Esforço Físico.



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RESUMEN

Objetivo: Caracterizar las personas que hacen deporte y actividades físicas en Brasil a través de la estratificación de los resultados de la Investigación Nacional de Muestra por Domicilio. **Métodos:** Se trata de un estudio ecológico de análisis estadístico descriptivo realizado con datos secundarios de nivel nacional a través de la Investigación Nacional de Muestra por Domicilio del año de 2015 con 71.142 mil personas de 151.189 mil unidades domiciliarias distribuidas por todas las Unidades de la Federación. Se realizó un análisis estadístico descriptivo y las variables cualitativas han sido organizadas en tablas y gráficos a través de la prueba chi-cuadrado considerando $p \leq 0,05$. **Resultados:** Se constató que el Distrito Federal es el estado que más hace actividad física en el país (30,9%) y el Mato Grosso el que menos ha realizado en el periodo investigado (8,4%). Respecto al deporte, Alagoas es el estado que menos ha practicado deporte (17%) y el Amazonas es el que más lo ha hecho (30,7%). Se ha visto aún una relación positiva entre la práctica de actividad física y deporte y la renta per cápita por domicilio ha evidenciado que a mayor renta, mayor la práctica de esas actividades. Sobre el estado civil se nota que los que se denominan solteros son los que más hacen ambas modalidades (el deporte 27% y la actividad física 18%) con diferencias significativas. **Conclusión:** Los que hicieron deporte y actividad física en Brasil en el año 2015 son del sexo masculino, con más escolaridad y renta, solteros y que buscaron esas actividades para mejorar su calidad de vida y el bienestar.

Descriptor: Actividad Motora; Ejercicio; Esfuerzo Físico.

INTRODUCTION

Globalization and the process of urbanization have led to several social, economic and epidemiological changes, including the increase in life expectancy and, consequently, the development of chronic and degenerative diseases. The increase in the number of these diseases has pointed to sedentary lifestyle as a risk factor for these diseases, thus leading public health systems to seek new strategies of health promotion and disease prevention with a focus on the improvement of quality of life and life habits, which include good nutrition and exercise⁽¹⁾.

Such a shift in the profile of illness in the population and the greater appreciation for the body and health in contemporary society have led to a stronger tendency to engage in physical activity and sports⁽¹⁾. This is because physical inactivity or low levels of physical activity have a strong association with the main chronic diseases affecting the world population, such as cardiorespiratory diseases (coronary artery disease, cardiovascular diseases, stroke, hypertension), metabolic diseases (diabetes and obesity), cancer (breast cancer, colon cancer), musculoskeletal diseases (osteoporosis), and depression⁽²⁾. Moreover, sedentary lifestyle is the main cause of more than 50% of deaths in Brazil⁽³⁾.

With the change in the concept of health started between the 70s and 80s and the creation of the Unified Health System (*Sistema Único de Saúde – SUS*), measures to encourage physical activity have increased both through the development of public health programs and through the expansion of physical practices and physical activity modalities promoted mainly by the National Health Promotion Policy (*Política Nacional de Promoção da Saúde – PNPS*), by people on their own, and by the private sector⁽⁴⁾.

With greater emphasis on health promotion and disease prevention strategies, the epidemiology of physical activity has been emphasized in health assessments and health-related processes. Such strategies require the surveillance and monitoring of risk factors through the diagnosis of each territory so as to employ measures to promote health and prevent and control diseases provided that such actions are focused on the main modifiable risk factors⁽⁵⁾. In order to assess the social and health statuses of the Brazilian population it is necessary to use instruments and strategies to search for such information⁽⁶⁾.

One of such instruments is the National Household Sample Survey (*Pesquisa Nacional por Amostra de Domicílios – PNAD*), which was created in 1967 with the aim of assessing socioeconomic development and gather information from all over the country. The PNAD uses several questionnaires and some specific health components that were assessed in 1998, 2003 and 2008. Physical activity was assessed for the first time in 2015 by the Brazilian Institute of Geography and Statistics (*Instituto Brasileiro de Geografia e Estatística – IBGE*)⁽⁷⁾.

The 2015 PNAD, in addition to outlining the demographic and socioeconomic profiles of the Brazilian population through the characterization of variables such as sex, age, employment, income, education, household, fecundity, among other characteristics, also assessed engagement in sport and physical activity in partnership with the Ministry of Sports. Such information is extremely important as they allow health professionals and public health services to know the level of physical activity of the population by region and hence create health promotion and disease prevention strategies targeted at these groups based on their needs⁽⁸⁾.

In view of the considerations outlined above and their importance, this study aimed to characterize the individuals who practice sports and physical activity in Brazil by stratifying the results of the 2015 National Household Sample Survey.

METHODS

This is an ecological study, which allows to evaluate how the social and environmental contexts can affect the health of population groups. Secondary data from the 2015 PNAD, which was gradually implemented in Brazil, were used in this study.

It should be noted that the 2015 PNAD included four additional complementary studies on engagement in sports and physical activity, access to the media (Internet, television, possession of mobile phone for personal use), issues related to the care of children aged less than 4 years, and aspects related to work and unionization⁽⁸⁾.

The study population was estimated by probability sampling in three stages. Primary units, represented by the municipalities, were categorized into self-representative and non self-representative. They were then divided into groups and each of them was selected with a probability proportional to the number of inhabitants as of the 2010 Demographic Census⁽⁸⁾.

Secondary units refer to the census tracts selected in each municipality of the sample based on the proportional probability obtained using existing household data from the 2010 Demographic Census as a measure of sample size. Tertiary units, represented by households, were obtained through the equiprobability by territorial unit of the sample of private households and collective households for the analysis of the characteristics of dwellers and dwelling.

The sample consisted of 1,100 municipalities and 151,189 households, with a total of 356,904 people participating in the survey. The supplementary studies on engagement in Sports Practice and Physical Activity were carried out with 71,142 thousand people over 14 years old according to the criteria established by the PNAD⁽⁸⁾.

It should be noted that households analyzed in the supplementary study on Sports Practice and Physical Activity were selected using a simple random sampling method from the 2015 PNAD sample. It is important to note that the percentages of households selected differed depending on the Federated State, namely Roraima and Amapá, with 100% of the households of the 2015 PNAD sample selected for the supplement, Acre, Piauí, Alagoas, Mato Grosso do Sul, Rio Grande do Norte and Tocantins, with 80%, and other Federated States, with 60%. Thus, in the last stage, one person aged 15 years or older was equiprobably selected from each household in the sample to answer the questionnaire⁽⁸⁾.

The questionnaire on sports and physical activity was composed of 34 multiple choice questions subdivided into 5 dimensions: one about the person who plays sports; one about the characteristics of the single or main sport; one about the person who has not played any sports in the past year; one about the person who did physical activity in the past year; and one about the characteristic of the single or main physical activity⁽⁸⁾.

The form aimed to identify people who engaged in sports or physical activity during the research period and the type of sport and physical activity, the reason, the frequency, the duration, the setting, and other factors related to the activity. The form also assessed marital status, socioeconomic aspects and reason for doing these activities. It should be noted that there were no criteria to distinguish sport and physical activity, i.e., the participants classified the type of activity themselves⁽⁸⁾.

Descriptive statistical analysis was performed and qualitative variables were organized in tables and graphs. Statistical inference was performed using the Chi-squared test with $p \leq 0.05$ in the Statistical Package for the Social Sciences (SPSS) version 22.0.

RESULTS

In 2015, 61.3 million (37.9%) people out of 161.8 million people aged 15 years or older did physical activity or played some sport.

In the South and Midwest regions the rate (41.1%) was higher than the national average, whereas the Northeast (36.3%), North (36.6%) and Southeast (37.5%) presented lower rates⁽⁸⁾.

It should be noted that the 2015 PNAD data are presented only as a percentage values in the original document and in all its references, i.e., the absolute values are not available.

Table I shows the data on physical activity and sport by state and federation of Brazil. The states with the highest rates of people engaged in physical activity are: Roraima (22%), in the North; Piauí (26.1%) and Paraíba (26.9%)

in the Northeast; São Paulo (19.9%), in the Southeast; Rio Grande do Sul (27.5%), in the South; and the Federal District (30.9%), in the Midwest.

As for sports, the states with the highest rates of people who played sports were Amazonas (30.7%), in the North, Ceará (22.9%) and Bahia (22%), in the Northeast, Minas Gerais (25.5%), in the Southeast, Santa Catarina (28.2%) in the South, and the Federal District (27.9%), Mato Grosso do Sul (27.8%) and Mato Grosso (27.8%), in the Midwest, Table I.

Table II depicts information on the reasons that led these people to engage in physical activity or sports according to per capita income per household and sex. The main reasons reported for both variables were based on maintaining quality of life and/or well-being, improving and or maintaining physical performance, and relaxing and/or having fun. It was also possible to observe a positive relationship between engagement in physical activity and sport and per capita income per household, thus showing that the higher the income, the greater the engagement in these behaviors.

Table I - Engagement in physical activity and sports in Brazil by state and federation. Proportional data from 71,142 Brazilians. Salvador, Bahia, 2015.

| State and Federation | Physical Activity (%) | | Sports (%) | |
|----------------------|-----------------------|------|------------|------|
| | Yes | No | Yes | No |
| North | | | | |
| Rondônia | 15.3 | 84.7 | 18.4 | 81.6 |
| Acre | 18.6 | 81.4 | 20.3 | 79.7 |
| Amazonas | 13.7 | 86.3 | 30.7 | 69.3 |
| Roraima | 22.0 | 78.0 | 22.8 | 77.2 |
| Pará | 12.4 | 87.6 | 24.7 | 75.3 |
| Amapá | 15.6 | 84.4 | 22.7 | 77.3 |
| Tocantins | 14.7 | 85.3 | 21.7 | 78.3 |
| Northeast | | | | |
| Maranhão | 20.7 | 79.3 | 19.9 | 80.1 |
| Piauí | 26.1 | 73.9 | 19.3 | 80.7 |
| Ceará | 15.1 | 84.9 | 22.9 | 77.1 |
| Rio Grande do Norte | 25.7 | 74.3 | 19.7 | 80.3 |
| Paraíba | 26.9 | 73.1 | 20.1 | 79.9 |
| Pernambuco | 12.5 | 87.5 | 20.7 | 79.3 |
| Alagoas | 12.9 | 87.1 | 17.0 | 83.0 |
| Sergipe | 20.0 | 80.0 | 21.2 | 78.8 |
| Bahia | 17.6 | 82.4 | 22.0 | 78.0 |
| Southeast | | | | |
| Minas Gerais | 18.6 | 81.4 | 25.5 | 74.5 |
| Espírito Santo | 17.9 | 82.1 | 24.1 | 75.9 |
| Rio de Janeiro | 16.6 | 83.4 | 18.0 | 82.0 |
| São Paulo | 19.9 | 80.1 | 23.4 | 76.6 |
| South | | | | |
| Paraná | 17.6 | 82.4 | 25.1 | 74.9 |
| Santa Catarina | 15.5 | 84.5 | 28.2 | 71.8 |
| Rio Grande do Sul | 27.5 | 72.5 | 22.8 | 77.2 |
| Midwest | | | | |
| Mato Grosso do Sul | 18.4 | 81.6 | 27.8 | 72.1 |
| Mato Grosso | 8.4 | 91.6 | 27.8 | 72.2 |
| Goiás | 17.6 | 82.4 | 26.0 | 74.0 |
| Federal District | 30.9 | 69.1 | 27.9 | 72.1 |

Source: 2015 National Household Sample Survey⁽⁸⁾

Figure 1 depicts the relationship between engagement in physical activity and sports according to the income of the study population. It was possible to observe a direct relationship between monthly per capita income per household and engagement in some type of activity. Individuals with an income of more than 3 minimum wages were more often engaged in sports and physical activity. The respondents who received 5-10 minimum wages were the ones with the highest rates of engagement in physical activity and sports while those who received less than

3 minimum wages presented the lowest rates. It should be noted that the rates of physical activity are higher than those of sports for all variables.

Table II - Reason for engaging in sports and physical activity by income and sex. Proportional data from 71,142 Brazilians. Salvador, Bahia, 2015.

| Main Reason \ No. Wages (%) | Up to 1 | | 2-3 | | 3-5 | | 5-10 | | More than 10 | |
|---|---------|------|------|------|------|------|------|------|--------------|------|
| | A | S | A | S | A | S | A | S | A | S |
| Medical advice | 17.2 | 9.4 | 9.6 | 6.0 | 11.1 | 8.3 | 11.7 | 6.4 | 9.9 | 8.0 |
| To improve or maintain Physical Performance | 22.8 | 17.5 | 28.0 | 21.3 | 27.2 | 25.6 | 26.3 | 31.8 | 27.0 | 22.7 |
| Quality of Life or Well-being | 39.0 | 23.3 | 41.2 | 26.3 | 44.4 | 35.8 | 50.5 | 39.8 | 49.5 | 44.0 |
| Likes competing | 1.2 | 11.1 | 2.2 | 9.6 | 2.0 | 6.7 | 0.9 | 2.6 | 2.0 | 5.8 |
| To relax\have fun | 15.9 | 34.1 | 15.7 | 31.9 | 12.6 | 20.4 | 8.8 | 17.1 | 11.1 | 17.2 |
| To socialize | 2.5 | 4.0 | 1.7 | 4.8 | 1.6 | 2.3 | 0.4 | 1.4 | 0.3 | 1.3 |
| Other | 1.4 | 0.5 | 1.5 | 0.1 | 1.0 | 0.8 | 1.4 | 0.9 | 0.3 | 1.1 |

| Main Reason by sex (%) | Men | | Women | |
|---|------|------|-------|------|
| | A | S | A | S |
| Medical advice | 12.0 | 5.6 | 20.5 | 20.2 |
| To improve or maintain Physical Performance | 27.8 | 19.0 | 21.1 | 22.2 |
| Quality of Life or Well-being | 35.9 | 21.7 | 44.4 | 39.4 |
| Likes competing | 3.1 | 11.9 | 1.1 | 3.5 |
| To relax\have fun | 17.6 | 36.4 | 10.5 | 12.4 |
| To socialize | 2.4 | 5.0 | 1.3 | 1.6 |
| Other | 1.1 | 0.4 | 1.1 | 0.7 |

A: Physical Activity; S: Sports; No.: Number. Source: 2015 National Household Sample Survey⁽⁸⁾

Table III shows the relationship between physical activity and level of education. The rate of engagement in sports was higher for all variables. Students enrolled in University Preparation Courses (56.8%), Master/Doctorate Programs (49.4%), Primary Schools (47%) and Higher Education Institutions (35.4%) adhered more to sports.

People enrolled in Master/Doctorate Programs (43.6%), Higher Education Institutions (29.1%) and Youth and Adult Literacy Programs (22%) were more engaged in physical activity. In both modalities, the most active groups were those with higher levels of education. (Table III).

As for the marital status of the people who did some type of body activity in Brazil during the research period, Table IV shows that both those who played sports and those who did physical activity were mostly single (27.0%). According to the Chi-squared test results, the association between marital status and engagement in sports and physical activity was statistically significant.

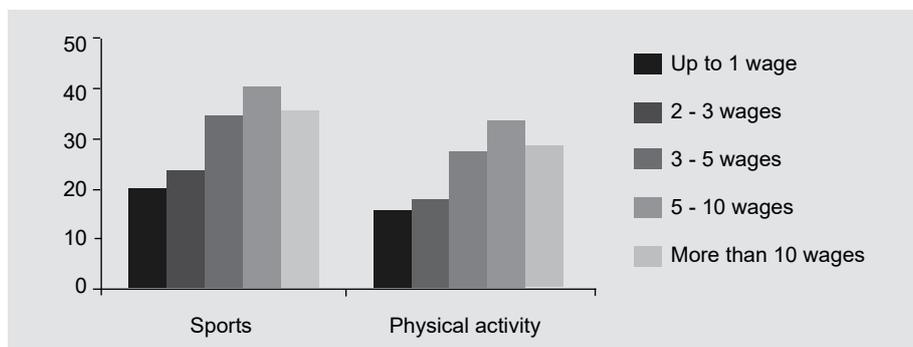


Figure 1 - Engagement in sports and physical activity by income. Proportional data from 71,142 Brazilians. Salvador, Bahia, 2015.

Source: 2015 National Household Sample Survey⁽⁸⁾

Table III - Engagement in activities by level of education. Proportional data from 71,142 Brazilians. Salvador, Bahia, 2015.

| Education | Modality (%) | |
|--|--------------|-------------------|
| | Sports | Physical Activity |
| Youth and Adult Literacy Program | 23 | 22 |
| Primary Education | 47 | 17.8 |
| Primary Youth and Adult Literacy Program | 25.1 | 14.1 |
| Secondary Youth and Adult Literacy Program | 31.6 | 18.5 |
| Secondary Education | 42.4 | 19 |
| University Preparation Course | 56.8 | 17.1 |
| Higher Education | 35.4 | 29.1 |
| Master/Doctorate Program | 49.4 | 43.6 |

Source: 2015 National Household Sample Survey⁽⁸⁾

Table IV - Engagement in sports and physical activity by marital status in Brazil. Proportional data from 71,142 Brazilians. Salvador, Bahia, 2017.

| Engagement/ Marital Status (%) | Married | | Legally separated | | Divorced | | Widowed | | Single | |
|--------------------------------|---------|------|-------------------|------|----------|------|---------|------|--------|------|
| | S | A | S | A | S | A | S | A | S | A |
| Engagement | 18.7 | 15.5 | 17.7 | 17.4 | 21.5 | 22.9 | 12.8 | 16.4 | 27.0 | 18.0 |

S: Sports; A: Physical Activity. Source: 2015 National Household Sample Survey⁽⁸⁾

DISCUSSION

The results of the present study show that approximately 61.3 million Brazilians are engaged in physical activity or sports, particularly in the South (40.8%) and Midwest regions (41.1%). Men's main reasons were relaxation and fun while women's reasons involved quality of life and well-being. Most people who were engaged in such activities were single (27.0%). The present study also showed that the higher levels of activity were directly proportional to higher levels of education and household income.

Physical activity is one of the key elements for the preservation and control of chronic diseases such as systemic arterial hypertension (SAH), diabetes mellitus (DM) and morbid obesity. The World Health Organization (WHO) estimated in 2010 that low levels of physical activity have been reported as the fourth leading risk factor for deaths worldwide. Given that, increasing daily physical activity integrated into a physical exercise routine is a determining factor in energy balance, which will directly influence the quality of life and health of the population⁽⁹⁾.

There is still no standard concept for actually defining the terms physical activity and exercise. However, physical exercise is understood as a subcategory of physical activity that is characterized by a planned, structured, repetitive and purposeful action towards improvement or maintenance of one or more components of physical fitness. Physical activity includes exercise and involves all kinds of body movement produced by the skeletal muscles that will result in an energy expenditure higher than resting levels⁽⁹⁾. The Brazilian Ministry of Health has developed strategies to encourage and develop body practices to improve the population's lifestyle and treat existing disorders, such as noncommunicable diseases⁽¹⁰⁾.

However, it is first necessary to know the profile of individuals who engage or not in such body practices in order to develop methods to encourage them to do these activities in order to maintain and promote their development. The results of the present study show that the highest prevalence of people who do physical activity and sports live in large regions, with the highest rates in the Federal District (30.7% and 27.9%). The sample was mostly composed of men (53.9%) who were engaged in both physical activity and sports. The main reasons for engaging in body practices were the search for relaxation and quality of life.

Studies carried out with data from population-based surveys have reported that practically half of the Brazilian population does not reach the recommended levels (150 minutes per week) of physical activity. Only about 22.5% to 24.4% of the population reached the recommended levels of leisure-time physical activity, with the highest rates

among men and people living in urban areas. Such reality suggests the need to strengthen actions to promote physical activity in the country^(11,12).

The present study shows that the number of people engaged in physical activity or sports increases proportionately with the level of education as the respondents enrolled in Master/Doctorate programs presented higher rates – 43.6% and 49.4%, respectively. This factor is related to access to information, which helps people understand the importance of body practices for their health and well-being. Moreover, studies have reported an association of level of education with sedentary lifestyle and, consequently, with increased chances of developing noncommunicable diseases related to lifestyle⁽¹³⁻¹⁵⁾.

Another important finding refers to the engagement in sport and physical activity and its positive association with monthly income, which can be explained by the increased access to settings and tools necessary for greater engagement in body practices, increased free time, body experiences that favor the adoption of more active lifestyles, among other things⁽¹⁶⁾.

Studies have shown that the socioeconomic status of a population is directly related to its level of activity and to higher prevalence rates of health-related problems such as cardiovascular and metabolic diseases (obesity, diabetes mellitus), monthly per capita income per household, levels of education and employment. All these variables are strongly associated with the level of physical activity and the health status of a population. Additionally, they are factors that may facilitate or even impede the achievement of a good health status^(17,18).

The association of physical activity and sports with marital status was also assessed. Some studies have reported greater engagement in body practices among single individuals and explained that it may be a result of these people's greater availability of time and because these activities may be means of socialization and leisure⁽¹⁶⁻¹⁸⁾. In the present study, single individuals were also more engaged in body activities (27.0%), thus corroborating the literature. Another study has shown that young single men are more engaged in physical exercises⁽¹⁸⁾.

In the present study, we also found a significant rate of engagement in sports among people with primary education (47%), who are generally young people. Physical activity should be encouraged and done in the school environment in order to promote an active lifestyle. However, the fact that adolescents exhibit a good perception of healthy habits and are active has not effectively influenced engagement in systematized physical activity with a focus on health promotion and encouragement to engage in these activities, thus leading to a sedentary lifestyle⁽⁹⁾.

Studies have reported that the environment where young people spend most of their time can positively influence the adoption of attitudes that will result in a healthy and active lifestyle. The school is therefore a fundamental place to influence the adoption of a healthy lifestyle by developing effective programs of physical education and encouraging students' participation. However, it is necessary to diagnose the profile of engagement in physical activity and potential risks in the population. The integration and joint work between school and families in terms of communication and cooperation is necessary for the adoption of a healthy lifestyle and engagement in physical activity in children's education. Additionally, positive models and parental encouragement for the development of more active and healthy lifestyles are also needed^(9,19).

It is believed that the present research can contribute to the engagement in physical activity and sports in the country as its results can serve as a basis for the improvement and implementation of public policies and strategies to increase population's adherence to physical activity and sport⁽²⁰⁾, which are essential for a healthier life.

CONCLUSION

The people who were engaged in sports and physical activity in Brazil in the year 2015, according to the stratification of the results of the National Household Sample Survey, are mostly men and single, have higher levels of education and income and sought these activities to improve their quality of life and well-being.

CONFLICTS OF INTEREST

There are no conflicts of interest.

CONTRIBUTIONS

Sara Souza Pontes, Alana das Mercês Silva and Laíza Muniz de Santana Santos. Study conception and design; acquisition, analysis and interpretation of data. **Brendo Vitor Nogueira Sousa and Elenilda Farias de Oliveira.** Analysis and interpretation of data; drafting and/or revision of the manuscript.

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