Original Article

RBAFS Revista Brasileira de Atividade Física & Saúde
SOCIEDADE BRASILEIRA DE ATIVIDADE FÍSICA & SAÚDE

rbafs.org.br

Insufficient physical activity in Brazil: Sex inequalities throughout the 21st century

Prática insuficiente de atividade física no Brasil: Iniquidades entre os sexos ao longo do século XXI

AUTHORS

Danilo Bastos Moreno[1]
Diego de Mélo Lima[2]
Juan Carlos Freire[2]
Jéssica Gomes Gonçalves[2]
Jorge Bezerra[2]
Daniel Rogério Petreça[3]
Andrea Ramirez Varela[4]
Marcos André Moura dos Santos[2]

1 Universidade de Pernambuco, Postgraduate studies in Hebiatry, Recife, Pernambuco, Brazil.

2 Universidade de Pernambuco, Postgraduate studies in Physical Education, Recife, Pernambuco, Brazil.

3 Universidade de Pernambuco, Department of Physical Education, Recife, Pernambuco, Brazil.

4 UTHealth Science Center at Houston, Department of Epidemiology, Houston, Texas, United States of America.

CORRESPONDING

Juan Carlos Freire
juancarlos.freire@upe.br
Rua Arnóbio Marques 310, Recife, Pernambuco, Brazil.
Zip Code: 50100-130.

DOI

10.12820/rbafs.31e0439i

ABSTRACT

Introduction: Insufficient physical activity is considered a risk factor for the development of non-communicable chronic diseases. However, this behavior is unequally distributed among population groups, and regional and social disparities have been revealed in Brazil. Objective: To analyze inequalities in physical activity practice between sexes throughout the early 21st century in Brazil. Methods: This is a cross-sectional observational epidemiological study using secondary open-access data from the Health Inequality Data Repository, available in the World Health Organization's Health Inequality Monitor toolkit. Data from Brazil, ranging from 2001 to 2022, were analyzed. Results: The data indicate that inequalities in physical activity persist, especially among women, with 30.9% of the general population engaging in insufficient physical activity in 2001 (Male - 29.3%; Female - 32.5%) and 40.9% in 2022 (Male - 35.7%; Female 45.8%) (95% CI: 32.4% to 59.9%). Conclusion: Reducing inequalities in the access to and practice of physical activity requires investment in surveillance and monitoring of disparities, as well as strengthening of intersectoral actions. It is essential that public policies consider the social determinants of health and promote more equitable and active environments.

Keywords: Physical activity; Social inequality; Health inequalities.

RESUMO

Introdução: Praticar atividade física insuficientemente é considerado um fator de risco para o acometimento de doenças crônicas não transmissíveis. Esse comportamento apresenta distribuição diferente entre grupos populacionais, revelando disparidades regionais e sociais no Brasil. Objetivo: Identificar as iniquidades da prática insuficiente de atividade física entre os sexos ao longo do início do século XXI no Brasil. Métodos: Trata-se de um estudo epidemiológico observacional de corte transversal realizado com o uso de dados secundários de acesso aberto do Repositório de Dados de Iniquidades em Saúde disponíveis no Monitor de Iniquidades em Saúde da Organização Mundial da Saúde. Foram observados dados do Brasil, de 2001 até 2022. Resultados: Os dados apontam que as desigualdades em atividade física persistem, principalmente entre mulheres, tendo 30,9% de prática insuficiente de atividade física na população em geral em 2001 (masculino – 29,3%; feminino – 32,5%) e 40,9% em 2022 (masculino – 35,7%; feminino – 45,8%) (IC 95%: 32,4% - 59,9%). Conclusão: A redução de iniquidades no acesso e prática de atividade física necessita do investimento em vigilância e monitoramento de desigualdades, bem como do fortalecimento de ações intersetoriais. É essencial que políticas públicas considerem determinantes sociais de saúde e possibilitem ambientes equitativos e mais ativos.

Palavras-chave: *Atividade física; Desigualdade social; Iniquidades em saúde.*

Introduction

The practice of insufficient physical activity (PIPA) is among the top twenty modifiable risk factors for chronic non-communicable diseases, accounting for approximately 1.4% of the global disease burden and contributing to increased mortality and disability rates in the world's population[1].

The World Health Organization and the Physical

Activity Guide for the Brazilian population recommend that adults engage in approximately 150 minutes of moderate-intensity physical activity (MPA) or 75 minutes of vigorous-intensity physical activity (VPA) per week, or an equivalent combination of MPA and VPA [2-4]. From this perspective, people who do not meet this recommendation have been classified as insufficiently physically active[2-4].

Despite international and national guidelines, levels of physical activity appear to be below ideal, with more than 25% of the world's population not reaching the minimum recommended levels of physical activity in 2010[5]. These data differ from the estimates made by the World Health Assembly regarding the reduction in PIPA in the world population[3].

The literature shows that the practice of physical activity is not just an individual choice, but a social product[6], which can be influenced by various factors, ranging from misinformation[7] to social inequality[8]. In the last decade, studies have shown that socioeconomic status, geographic factors, and sex inequalities[6,9] have repercussions on physical activity practices and are reflected in the PIPA index.

Global analysis studies[9], as well as those in countries such as Colombia[10] and the United Kingdom[11], argue that women, when compared to men, do not adequately meet the recommendations for physical activity, presenting higher prevalences of PIPA, which suggests that men are more involved in active movement practices. The cited studies present the prevalence of PIPA comparing men and women; however, no temporal analyses were identified in the literature considering the years 2001 to 2022 in Brazil.

Given this scenario, there is a need to identify inequalities related to physical activity practice throughout the beginning of the 21st century (focusing on the years 2001 to 2022), in order to support public policies and inform strategies for promoting physical activity, making them more effective and equitable, particularly those related to sex. Therefore, the current study sought to identify sex inequalities in physical activity practice throughout the beginning of the 21st century in Brazil, focusing on the years 2001 to 2022.

Methods

This is a cross-sectional observational epidemiological study, conducted using open-access secondary data from the Health Inequality Data Repository, available from the World Health Organization's Health Equity Monitor toolkit. Data from Brazil, from 2001 to 2022, were extracted. Currently, the country has a population of over 203 million inhabitants, the majority of whom are women (51.5%) and brown people (black and mixed-race people – 55.5%).[12].

The sample consists of individuals of both sexes, aged 18 or older. Information regarding the data collection process and sample scope is available in other publications[9]. However, it is should be understood that these are representative samples of the country's population.

Variables

The outcome indicator of interest in this research is the PIPA. Self-reported information on the variables of interest was collected through questionnaires, including the Global Physical Activity Questionnaire (GPAQ) and International Physical Activity Questionnaire (IPAQ), or similar, that addressed the four dimensions of physical activity, applied in national surveys. Insufficient physical activity levels were determined following the World Health Organization guidelines of 150 minutes of moderate-to-vigorous physical activity per week, or 75 minutes of vigorous physical activity per week, or an equivalent combination.

As the independent variable, the dimension of sex inequality was chosen. This selection was due to its importance as a factor in social difference, and because it was also recorded in the same studies that collected information on the outcome indicator. In the current study, individuals were classified as male and female, following the classification available in the database.

For this research, the outcome measure used was the prevalence of PIPA and the respective confidence interval for each sex.

Data collection and source

The data used in this document are available and openly accessible from the Health Inequality Data Repository, available on the World Health Organization's Health Equity Monitor toolkit (HEAT), version 6.0[13,14].

Access to the information and analysis took place according to the following sequence. Initially, the Health Equity Monitor website was accessed, next, through the HEAT tool access, the Adult Health section was selected, followed by the subsection Non-Communicable Diseases and Risk Factors. On the following page, the Portuguese language and Brazil as the country of interest were selected, and the indicator Insufficient physical activity among adults aged 18+

Years (crude estimate) (%). Finally, the selected years from the 21st century (2001 – 2022) was maintained.

Data analysis

After accessing the information, the prevalence data, by sex and their respective confidence intervals, were downloaded into tables and graphs, which were subsequently analyzed descriptively.

Initially, disaggregated analyses were performed, which are measures that allow for the observation of existing differences between groups by breaking down the overall averages among the analyzed subgroups. For this, the prevalence of PIPA was used as an indicator, and sex as a dimension of inequality, as per the guidelines of the HEAT technical note[15]. The prevalence of PIPA by sex, year by year, is presented both through a description of the values and graphically.

Next, summarized analyses were initiated using Difference and Ratio estimates. According to HEAT[15], summary measures utilize disaggregated data and simplify them into a single numerical measure, making it easier to observe the extent of inequality and its variation over the years.

The difference is an absolute measure that compares the sexes through a simple subtraction (higher value – lower value), so the higher the value, the greater the inequality. On the other hand, the Ratio is a relative measure that allows us to observe proportional differences between groups. The Ratio is calculated by dividing the highest prevalence by the lowest prevalence. In the case of the Ratio, the value obtained follows a logarithmic scale, where 1.0 represents equality, and the further from 1.0, the greater the inequality[15].

Results

The analysis of disaggregated year-by-year data, available in the supplementary material, shows that in the first year (i.e., 2001) of the period considered, the average estimate of PIPA prevalence in Brazil was 30.9% (Male - 29.3%; Female - 32.5%). In 2022, the final year of the period, the average estimate of PIPA prevalence in the country was 40.9%, thus demonstrating an increase of approximately 10 percentage points in the PIPA estimate over the years studied. Among males, over the 22-year period, the prevalence increased by 6.4 percentage points, reaching 35.7%, while among females, the increase observed was 13.3% over 22 years, reaching a prevalence of PIPA of 45.8% (95% CI - 32.4% to 59.9%). Figure 1 shows the growth of PIPA and the increase in the differences in prevalence between sexes in Brazil between 2001 and 2022, visually indicating the increases in PIPA in both sexes, although more evident in females.

The analysis of the summarized measures indicated the existence of inequality in PIPA between the sexes, and that this inequality increased linearly over the years studied. The measure of the difference between women (higher prevalence) and men (lower prevalence) in 2001 indicated a 3.2% higher prevalence of PIPA among females, as can be seen in Figure 2.

Ten years after the first measurement, in 2010, the difference had nearly doubled, reaching 6.1%. In 2022, the difference between prevalences was 10.0%, showing an increase of 6.8 percentage points in the prevalence of PIPA over the period. In other words, between 2001 (3.2%) and 2022 (10%), there was a 312% increase in the difference between the sexes.

Figure 3 presents the relative measure of the Ratio, showing that the proportion of PIPA prevalence between the sexes (Female/Male) increased, practically linearly, by 1% per year between 2001 and 2022, remaining stable only 4 times during the period. From 2001 to 2022, the Ratio increased from 1.11 to 1.28; that is, while in 2001 women were 11% more inactive, in 2022 this value increased to 28%.

Discussion

The current study aimed to identify sex inequalities in the PIPA throughout the early 21st century in Brazil, focusing on the years 2001 to 2022. The results showed that, during the study period, there was an increase in inequality, with a difference of around 6.8 percentage points and a 17% increase in the sex ratio.

The disaggregated analysis indicated a high prevalence of PIPA in both sexes throughout the evaluated period. In 2002, Matsudo et al.[16] identified a higher prevalence of PIPA among women (39.3% among women and 35.9% among men)[16]. Despite various policies aimed at reducing inequalities, the scenario remained the same, as observed in a comparative study between 2003 and 2015, where the practice of high-intensity physical activity was more prevalent among males[17].

These differences can be understood in light of occupational and sociocultural factors, since men are more likely to be active in leisure, commuting, and work, while women are more likely to be active in domestic activities[18]. In an international context, it is observed that men, young people, and those with higher

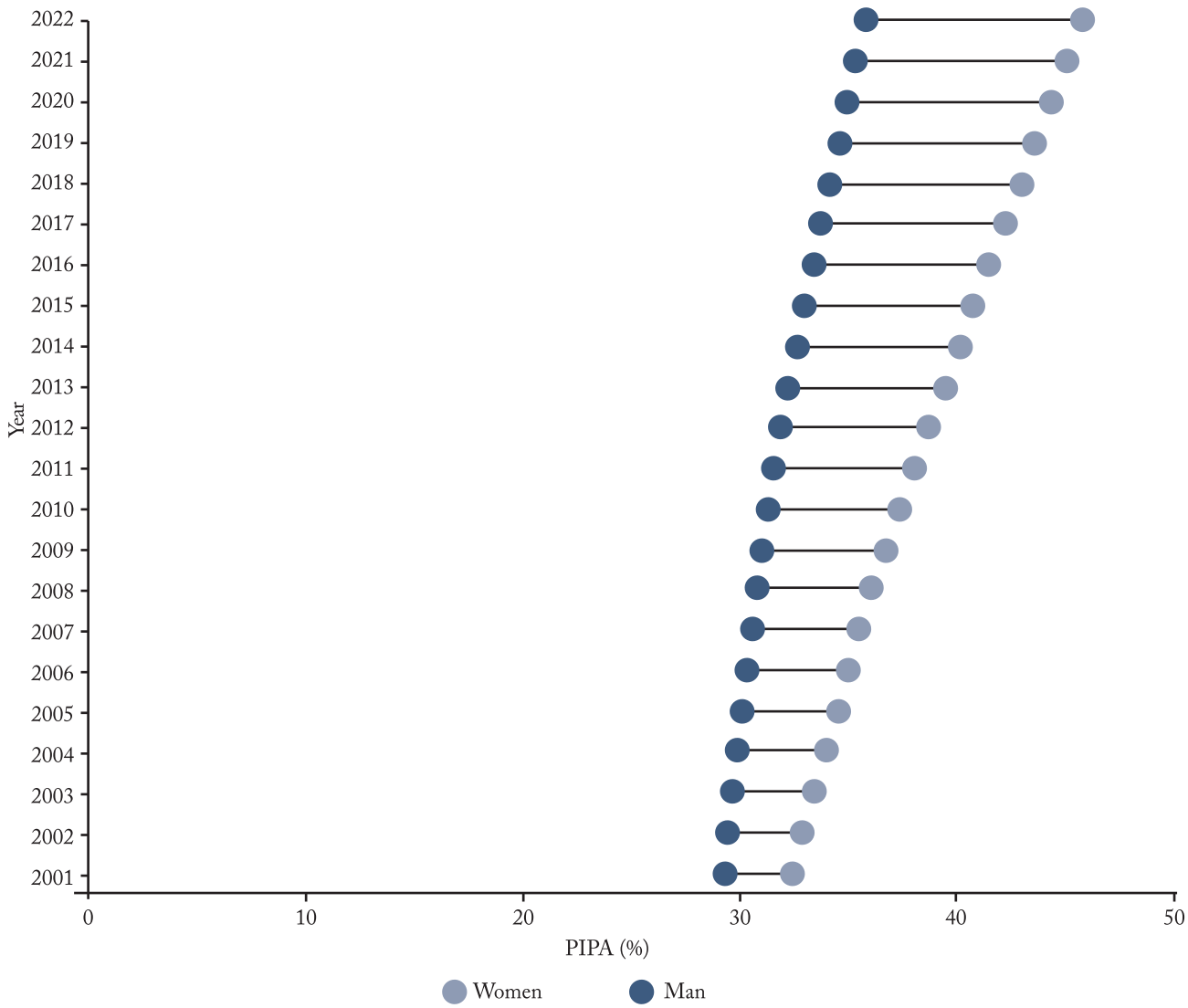

Figure 1 – Prevalence of insufficient physical activity (PIPA) among males and females during the early 21st century, focusing on the years 2001 to 2022 in Brazil. Health Equity Assessment Toolkit (HEAT).

levels of education are more likely to meet the recommendations[19]. Furthermore, marital status is perceived to be a factor, with the practice being less prevalent among married people[20]. These disparities point to structural inequalities, according to the Inverse Equity Hypothesis and the Inverse Care Law[8]. Furthermore, there is a possibility that methodological differences in the measurement of physical activity may affect the results, highlighting the need for analyses that consider multiple contexts and domains, in order to guide more equitable and effective public policies.

The observed differences do not appear to be related solely to economic factors, considering that a similar reality is found in various parts of the world. For example, in Europe, more precisely in the countries of the European Union, a quarter of individuals did not meet the World Health Organization's recommendations for physical activity[21]. Another study highlighted that women were less likely, compared to men, to be sufficiently physically active. [22]. Meanwhile, in the African Region, it is estimated that approximately 21% of the population does not meet the World Health Organization's recommendations for physical activity, with figures increasing over the years and women remaining less active than men[23]. In China, a country of continental size and population, the prevalence of physical inactivity among women reached 45.4% of the total population, highlighting a sex disparity similar to that found in studies conducted in other parts of the world[24].

The existence and increase in inequality between men and women over the years analyzed, whether calculated in absolute or relative terms, was reinforced by

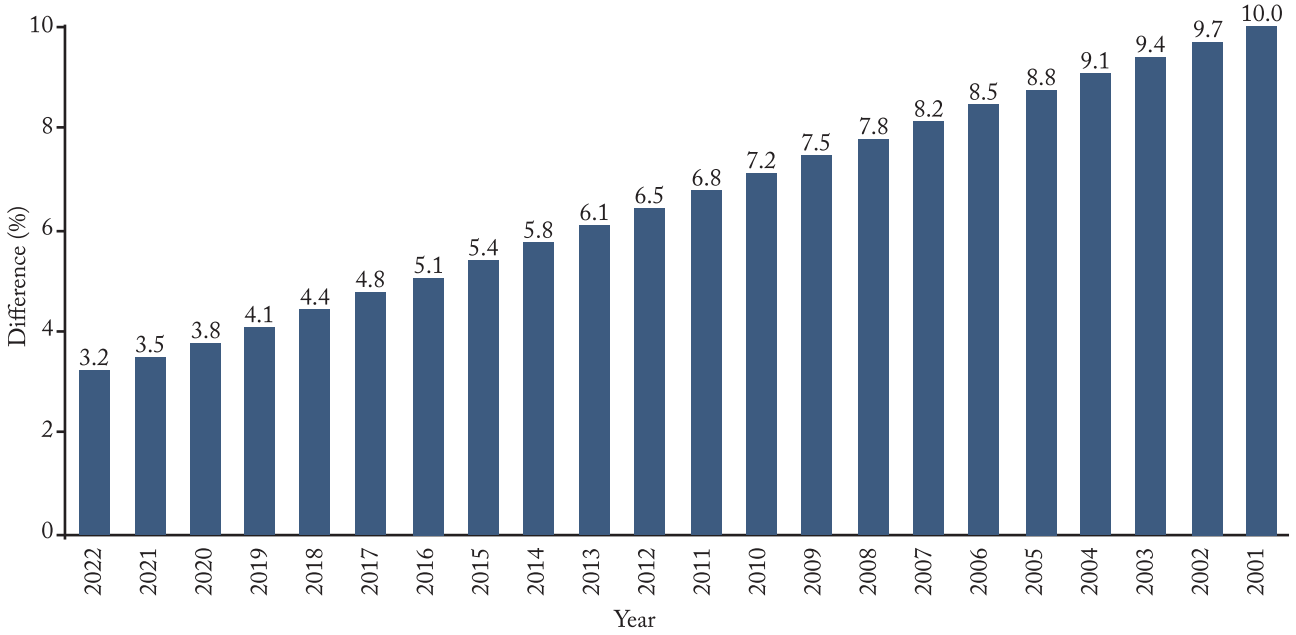

Figure 2 – Differences in inequality of insufficient physical activity between sexes (2001-2022) in Brazil

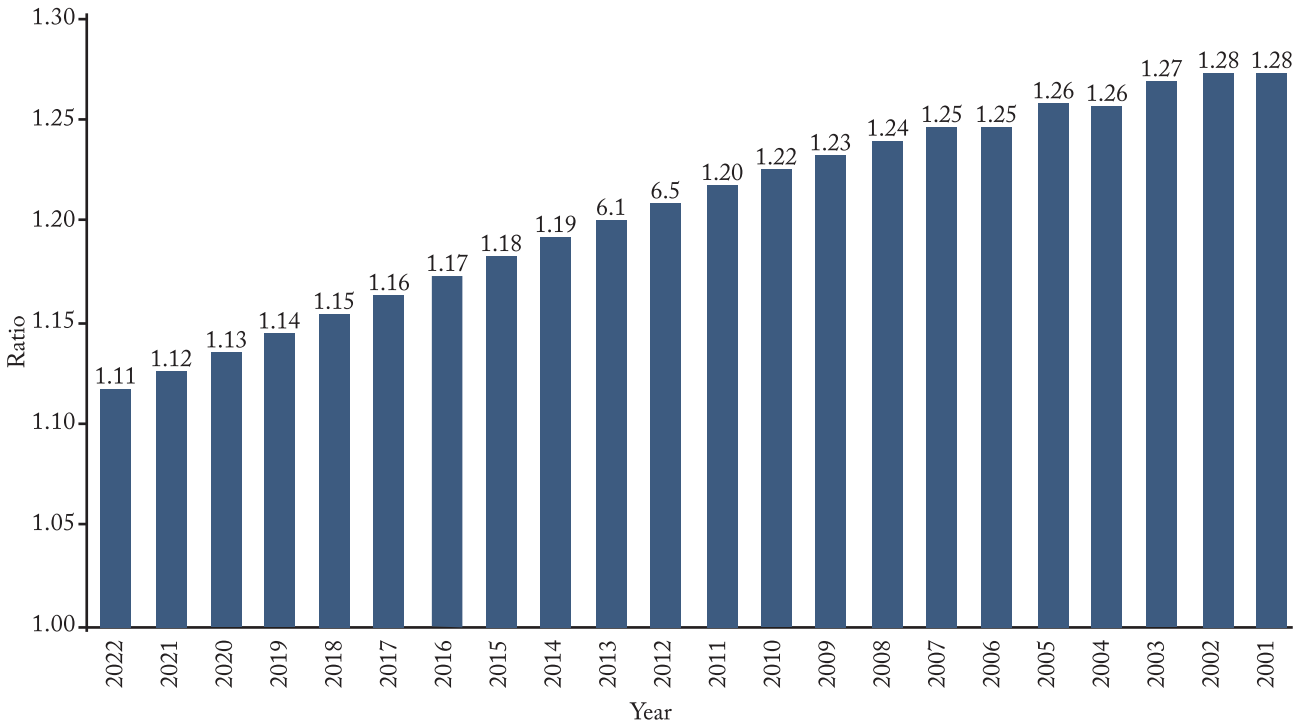

Figure 3 – Ratios of inequality of insufficient physical activity between sexes (2001-2022) in Brazil.

the studies cited here. Among the possible justifications, we can point to the attitudinal factor, considering that women present more negative attitudes towards the practice of physical activities and perceive the environment as less favorable to their performance[17]. Another relevant factor contributing to this sex disparity is sociodemographic factors, as being male, younger, residing in rural areas, having a higher level of education, and facing fewer financial difficulties are factors associated with adequate levels of physical activity[18,19].

The country's cultural makeup can also influence differences in physical activity practices between the sexes. From early childhood, the types of play assigned to boys and girls differ, with girls often restricted to play related to caregiving and domestic tasks, while boys are encouraged to engage in physical and sporting activities[25]. In addition to the double burden placed on women, as they increase their participation in the la-

bor market, they continue to be primarily responsible for reproductive work and household management[26]. The literature is clear and robust regarding the harmful effects of physical inactivity, which is a significant risk factor for several chronic diseases, negatively impacting people's health[27-29]. High-frequency anxiety is associated with a higher risk of developing cardiovascular and cerebrovascular diseases, as well as disorders such as anxiety, insomnia, and depression [30]. In addition to these impacts, it is also noteworthy that insufficient levels of physical activity are associated with approximately 3.2 million deaths annually, including 9% of premature deaths globally, as well as a reduction in the life expectancy of physically inactive individuals[24].

The data analyzed in the current study were collected at the end of the COVID-19 pandemic. However, in the post-pandemic period, a decrease in physical activity levels was observed, along with an increase in sedentary behavior[31], which may have exacerbated the problem of PIPA in Brazil, especially among women. In Brazil, the practice of physical activity and the reduction in the PIPA prevalence are highlighted in the National Health Promotion Policy[32]. Several programs, projects, and strategies aimed at promoting physical activity, reducing sedentary behavior, and achieving healthy habits have been or are being developed in the country. Among them, we can highlight the Family Health Support Center, e-multi, Physical Activity Incentive Program, Health Academy Program, and the Physical Activity Guide for the Brazilian Population[33]. Furthermore, the country stands out as a center for research and development in the field of Physical Activity, ranking fourth in the world[34].

Despite the favorable conditions existing in Brazil (public policies and scientific research), these factors have apparently not yet proven effective in reducing PIPA inequality throughout the century, both nationally and globally. In this sense, it is necessary to evaluate the actions being developed, identify limitations, and propose changes to programs or strategies for promoting physical activity, ensuring equitable access, and encouraging the adoption of a more active lifestyle.

Considering these aspects, aligning with Sustainable Development Goal #5 (Gender Equality), achieving gender equality and empowering all women and girls is essential to guide strategies that address the structural barriers that limit physical activity among women.

The current study presents limitations that need to be reported, including the use of secondary data collected through questionnaires, which may underestimate or overestimate PIPA. Furthermore, cultural, geographical, and age-related factors in relation to physical activity behaviors can be contextualized, which, to some extent, limits direct comparisons and inferences. However, the same data are made available in open access by one of the world's leading health organizations and are used in various research studies and in the creation of public policies.

Conflict of interest

The authors declare no conflicts of interest.

Authors' contribution

Moreno DB: Conceptualization; Methodology; Data analysis; Research; Project management; Original manuscript writing; Approval of the final version of the manuscript. Lima DM: Conceptualization; Methodology; Data analysis; Research; Data presentation design; Original manuscript writing; Approval of the final version of the manuscript. Freire JC: Conceptualization; Research; Writing - revision and editing; Approval of the final version of the manuscript. Gonçalves JG: Conceptualization; Research; Drafting of the original manuscript; Approval of the final version of the manuscript. Bezerra J: Supervision; Drafting - revision and editing; Approval of the final version of the manuscript. Petreça DR: Data presentation design; Drafting of the original manuscript; Approval of the final version of the manuscript. Varela AR and Santos MAM: Methodology; Supervision; Drafting - revision and editing; Approval of the final version of the manuscript.

Statement regarding the use of artificial intelligence tools in the article writing process

The authors did not use artificial intelligence tools to prepare the manuscript.

Availability of research data and other materials

The content is already available

References

1. Murray CJ, Aravkin AY, Zheng P, Abbafati C, Abbas KM, Abbasi-Kangevari M, et al. Global burden of 87 risk factors in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. Lancet. 2020;396(10258):1223–49. doi: https://doi.org/10.1016/S0140-6736(20)30752-2
2. World Health Organization. More active people for a healthier world. Global Action Plan on Physical Activity 2018–2030. Geneva: WHO; 2018. Available from:<https://apps.who.int/iris/bitstream/handle/10665/272722/9789241514187-eng.pdf> [2025 abril].

3. World Health Organization. Seventy-first World Health Assembly. Physical activity for health. Geneva: WHO; 2018. Available from:<https://apps.who.int/gb/ebwha/pdf_files/WHA71/A71_18-en.pdf> [2025 abril].
4. Brasil. Ministério da Saúde. Secretaria de Atenção Primária à Saúde. Departamento de Promoção da Saúde. Guia de atividade física para a população brasileira [recurso eletrônico]. Brasília: Ministério da Saúde; 2021. 54 p. Available from:<http://bvsms.saude.gov.br/bvs/publicacoes/guia_atividade_fisica_populacao_brasileira.pdf > [2025 abril].
5. Guthold R, Stevens GA, Riley LM, Bull FC. Worldwide trends in insufficient physical activity from 2001 to 2016: a pooled analysis of 358 population-based surveys. Lancet Glob Health. 2018;6(10):e1077–86. doi: http://dx.doi.org/10.1016/ S2214-109X(18)30357-7
6. Mielke GI, Hallal PC, Malta DC, Lee IM. Leisure time physical activity among Brazilian adults: National Health Survey 2013 and 2019. Rev Bras Epidemiol. 2021;24(Suppl 2):e210008. doi: https://doi.org/10.1590/1980-549720210008.supl.2
7. Waters EA, Hawkins E. Awareness of health outcomes associated with insufficient physical activity and associations with physical activity intentions and behavior. J Health Commun. 2018;1–9.doi: https://doi.org/10.1080/10810730.2018.1500658
8. Crochemore-Silva I, Knuth AG, Wendt A, Hallal PC. Promoção de atividade física e as políticas públicas no combate às desigualdades: reflexões a partir da Lei dos Cuidados Inversos e hipótese da equidade inversa. Cad Saúde Pública. 2020;36(6):e00155119. doi: https://doi.org/10.1590/0102-311X00155119
9. Strain T, Flaxman S, Guthold R, Semenova E, Cowan M, Riley LM, et al. National, regional, and global trends in insufficient physical activity among adults from 2000 to 2022: A pooled analysis of 507 population-based surveys with 5·7 million participants. Lancet Glob Health. 2024;12(8):e1232–43. doi: https://doi.org/10.1016/S2214-109X(24)00150-5
10. González S, Lozano Ó, Ramírez A, Grijalba C. Niveles de actividad física de la población colombiana: desigualdades por sexo y condición socioeconómica. Biomédica. 2014;34(3):447–59. doi: http://dx.doi.org/10.7705/biomedica.v34i3.2258
11. Yahia N, Wang D, Rapley M, Dey R. Assessment of weight status, dietary habits, physical activity, and nutritional knowledge among university students. Perspect Public Health. 2016;136(4):231–44. doi: https://doi.org/10.1177/1757913915609945
12. IBGE. Panorama do Censo 2022. Rio de Janeiro: IBGE; 2022. Available from: <https://censo2022.ibge.gov.br/panorama/> [2025 abril].
13. Hosseinpoor AR, Bergen N, Schlotheuber A, Grove J, Boerma T. Health Equity Assessment Toolkit Plus (HEAT Plus): software for exploring and comparing health inequalities. Glob Health Action. 2018;11(Suppl 1):20–30. doi: https://doi.org/10.1080/16549716.2018.1440783
14. Kirkby K, Hosseinpoor AR, Boerma T. Health Equity Assessment Toolkit (HEAT and HEAT Plus): exploring inequalities in the COVID-19 pandemic era. Int J Equity Health. 2022;21(Suppl 3):172. doi: https://doi.org/10.1186/s12939-022-01765-7
15. World Health Organization. Health Equity Assessment Toolkit (HEAT and HEAT Plus). 2023. Available from:<https://www.who.int/data/inequality-monitor/assessment_toolkit> [2025 abril].
16. Matsudo SM, Araújo TL, Matsudo VKR, Andrade DR, Oliveira LC, Braggion G. Nível de atividade física da população do Estado de São Paulo: Análise de acordo com o gênero, idade, nível socioeconômico, distribuição geográfica e de conhecimento. Rev Bras Cien Mov. 2002;10(4):41–50. doi: https://doi.org/10.18511/rbcm.v10i4.469
17. Figueiredo TKF, Turi-Lynch BC, Barbosa AR, Florindo AA, Parra DC, Rech CR. Changes in total physical activity, leisure and commuting in the largest city in Latin America, 2003–2015. Rev Bras Epidemiol. 2021;24:e210030. doi: https://doi.org/10.1590/1980-549720210030
18. Bicalho PG, Hallal PC, Gazzinelli A, Knuth AG, Velásquez-Meléndez G. Atividade física e fatores associados em adultos de área rural em Minas Gerais, Brasil. Rev Saúde Pública. 2010;44(5):884-93. doi: https://doi.org/10.1590/S0034-89102010000500009
19. El Ansari W, Khalil K, Ssewanyana D, Stock C. Physical activity and associated socio-demographic factors among university students in Libya. Cent Eur J Public Health. 2014;22(4):220-7. doi: https://doi.org/10.21101/cejph.a3948
20. Henkemaier KCM, Hino AAF, Santos GM, Souza IRS, Lorenzi LJ, Ribeiro Junior JF, Gomes GAO, Guerra PH. Estado civil e prática de atividade física em adultos brasileiros: uma revisão sistemática. Rev Interdiscip Prom Saúde. 2024;7(3):35-48. doi: https://doi.org/10.17058/rips.v7i3.18821
21. Gerovasili V, Agaku IT, Vardavas CI, Filippidis FT. Levels of physical activity among adults 18–64 years old in 28 European countries. Prev Med. 2015;81:87–91. doi: https://doi.org/10.1016/j.ypmed.2015.08.005
22. Nikitara K, Odani S, Demenagas N, Rachiotis G, Symvoulakis EK, Tzatzarakis MN, et al. Prevalence and correlates of physical inactivity in adults across 28 European countries. Eur J Public Health. 2021;31(4):840–5. doi: https://doi.org/10.1093/eurpub/ckab067
23. Guthold R, Cowan MJ, Autenrieth CS, Kann L, Riley LM. Physical activity in 22 African countries: results from WHO STEPs. Am J Prev Med. 2011;41(1):52–60. doi: https://doi.org/10.1016/j.amepre.2011.03.008
24. Lee I-M, Shiroma EJ, Lobelo F, Puska P, Blair SN, Katzmarzyk PT. Effect of physical inactivity on major non-communicable diseases worldwide: an analysis of burden of disease and life expectancy. Lancet. 2012;380(9838):219–29. doi: https://doi.org/10.1016/S0140-6736(12)61031-9
25. Altmann H, Ayoub E, Garcia EF, Rico ER, Polydoro SAJ. Gênero e cultura corporal de movimento: práticas e percepções de meninas e meninos. Rev Estud Fem. 2018;26(1):e44074. doi: https://doi.org/10.1590/1806-9584.2018v26n144074
26. Biroli F. Divisão Sexual do Trabalho e Democracia. Dados. 2016;59(3):719–54. doi: https://doi.org/10.1590/00115258201690
27. Liu W, Dostdar-Rozbahani A, Tadayon-Zadeh F, Akbarpour-Beni M, Pourkiani M, Sadat-Razavi F, Barfi V, Shahedi V. Insufficient level of physical activity and its effect on health costs in low- and middle-income countries. Front Public Health. 2022;10:937196. doi: https://doi.org/10.3389/fpubh.2022.937196
28. Bull FC, Al-Ansari SS, Biddle S, et al. World Health Organization 2020 guidelines on physical activity and sedentary behaviour. Br J Sports Med. 2020;54:1451–62. doi: https://doi.org/10.1136/bjsports-2020-102955

29. Mok A, Khaw KT, Luben R, Wareham N, Brage S. Physical activity trajectories and mortality: population based cohort study. BMJ. 2019;365:l2323. doi: https://doi.org/10.1136/bmj.l2323

30. Hao M, Fang Y, Yan W, Gu J, Hao Y, Wu C. Relationship between body dissatisfaction, insufficient physical activity, and disordered eating behaviors among university students in southern China. BMC Public Health. 2022;22(1):2054. doi: https://doi.org/10.1186/s12889-022-14515-9

31. Savage MJ, Procter EL, Magistro D, Hennis PJ, Donaldson J, Leslie-Walker A, Jones BA, James RM. Characterising the activity, lifestyle behaviours and health outcomes of UK university students: an observational cohort study with a focus on gender and ethnicity. BMC Public Health. 2024;24(1):3501. doi: https://doi.org/10.1186/s12889-024-20911-0

32. Malta DC, Silva AG, Lima CM, Morais Neto OL. O SUS e a Política Nacional de Promoção da Saúde: resultados e desafios. Cien Saude Colet. 2018;23(6):1799–809. doi: https://doi.org/10.1590/1413-81232018236.04782018

33. Carvalho FFB, Guerra PH, Silva DB, Vieira LA. Oferta e participação nas práticas corporais e atividades físicas na atenção primária no Brasil: análise de 2014 a 2022. Cien Saude Colet. 2025;30(1):e09492023. doi: https://doi.org/10.1590/1413-81232025301.09492023

34. ISPAH – International Society for Physical Activity and Health. Brazil Country Card – 2nd Global Physical Activity Almanac. Global Observatory for Physical Activity – GoPA! 2021. Available from:<https://new.globalphysicalactivityobservatory.com/New%20Translation%20of%20country%20cards/Brazil%20trad.pdf> [2025 abril].

Received: 05/05/2025
Reviewed: 06/20/2025
Approved: 01/21/2026

Cite this article as:
Moreno DB, Lima DM, Freire JC, Gonçalves JG, Bezerra J, Petreça DR, Varela AR, Santos MAM. Insufficient physical activity in Brazil: Sex inequalities throughout the 21st century. Rev. Bras. Ativ. Fis. Saúde. 2026;31:e0439i. doi: 10.12820/rbafs.31e0439i