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Practice of physical activities and associated factors in adults, Brazil, 2006

ABSTRACT

OBJECTIVE: To estimate the prevalence of physical activity practice in adults and its association with sociodemographic and environmental factors.

METHODS: Data from the *Sistema de Vigilância de Fatores de Risco e Proteção para Doenças Crônicas por Inquérito Telefônico* (VIGITEL – Telephone-based Surveillance of Risk and Protective Factors for Chronic Diseases) were collected in 2006. All the 54,369 adults interviewed lived in households with a fixed telephone line, in the Brazilian state capitals and Federal District. Physical activity practice was considered in the leisure-time, occupational, transportation and household domains. Variables studied included sociodemographic characteristics of individuals and environmental characteristics of cities. Association with physical activities was analyzed according to sex.

RESULTS: Proportions of active individuals were 14.8% for leisure time, 38.2% for occupation, 11.7% for transportation, and 48.5% for household chores. Indices above 60% of inactive individuals in the leisure-time domain were observed in ten capitals. Men were more active than women in all domains, except for household chores. The proportion of active individuals decreased with age. Level of education was directly associated with physical activity in leisure time. Active men in the transportation domain were more likely to be active in their leisure time, while inactive people in the occupational domain were more likely to be active in their leisure time. The existence of places to perform physical activities near the home was associated with physical activity in leisure time.

CONCLUSIONS: Results obtained are important to monitor physical activity levels in Brazil. Differences between men and women and those in age groups and levels of education must be considered to promote physical activities. Promotion of physical activities in the leisure and transportation domains and in places that are adequate for physical activity practice and near the home should be encouraged.

DESCRIPTORS: Socioeconomic Factors. Chronic Disease, prevention & control. Health Surveys. Brazil. Physical Activities. Telephone interview.

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INTRODUCTION

The new paradigms of relationships between physical activities and health show that the assessment practices in the leisure-time, occupational, transportation and household domains is fundamental. Pate et al (1995)¹⁸ summed up the strength of all the evidence published in the last 50 years and showed the importance of the practice of physical activities in these four domains to prevent diseases and improve people's quality of life.

The practice of physical activities according to domains is little studied. Leisure is the most frequently studied domain, with higher frequency in epidemiological surveys, both in high-income countries^{1,3,5,12,13,17} and middle- or low-income ones.^{2,11,14,19,22,23} However, other types of physical activities, in addition to leisure-time ones, are important, especially in middle- and low-income countries, due to certain social characteristics.¹⁰

The aim of the present study was to describe the practice of physical activities of adults in the leisure-time, occupational, transportation and household domains and its association with sociodemographic and environmental factors.

METHODS

Cross-sectional study using data collected from the Telephone-based Surveillance of Risk and Protective Factors of Chronic Diseases (VIGITEL),¹⁶ implemented in 2006 by the Ministry of Health. VIGITEL included the assessment of four domains in all Brazilian state capitals and the Federal District.

A total of 54,369 interviews were conducted by VIGITEL with adults (≥ 18 years) living in households with a fixed telephone line, in 26 state capitals and the Federal District, in 2006. The probability sample used in this study was based on records from fixed telephone companies (minimum of two thousand adults per city).¹⁶

VIGITEL's response rate was 71.1%, varying from 64.4% to 81.0%; the refusal rate was 9.1%, varying from 5.4% to 15.0%.

The entire 2006 VIGITEL sampling process detailing and data collection was described by Moura et al¹⁶ (2008).

The practice of physical activities was assessed according to the domains: leisure-time (practice of one category of sport/physical exercise, describing its intensity and type, as well as its weekly frequency and daily length), occupational (carrying weight or walking for a long time), transportation (going to and coming back from work on foot or by bicycle) and household chores (light or heavy household cleaning). Individuals were classified as active in leisure time when

reporting physical activities of moderate intensity for at least 30 minutes, for five or more days a week, or activities of vigorous intensity for at least 20 minutes, for three or more days a week. An activity is considered moderate intensity when it involves energy expenditure equivalent to three to six times the resting value, and vigorous intensity, when equivalent to at least six times the resting value. Individuals were considered active at work when they reported carrying weight or heavy load, or when walking for a long time at work.

For the transportation domain, active individuals were those who reported going to and coming back from work on foot or by bicycle for at least 30 minutes a day. For household chores, individuals were considered active when they reported being responsible for most of the heavy household cleaning.

Reproducibility of VIGITEL questions about physical activity is high (kappa coefficient of 0.80 and 0.78 for active individuals in the leisure-time domain and inactive ones in the four domains, respectively).¹⁵ VIGITEL questionnaire validity, compared to 24-hour recalls of physical activities, showed specificity between 80.5% and 86.5% and sensitivity between 50.0% and 59.1% for active individuals in the leisure-time domain and inactive ones in the four domains, respectively. Mean number of minutes per week of physical activities practiced in leisure time from the 24-hour recall method was higher in individuals considered active than in those considered inactive in leisure time from VIGITEL. Mean number of minutes per week of physical activities in the four domains (leisure-time, occupational, household and transportation), as measured by the recall method, was lower in individuals considered inactive in the four domains than in the remaining ones assessed by VIGITEL.¹⁵

Demographic and socioeconomic characteristics considered were as follows: age, sex, marital status, skin color, level of education, number of people and rooms in the household, number of adults and number of fixed telephone lines in the household.

Environmental variables for physical activity practice were related to the presence of places to walk and practice physical exercises close to the home, such as public or private clubs, gyms, squares, streets, parks and schools.

Prevalence of inactive individuals in the leisure-time domain was calculated based on individuals who did not practice any physical activity in leisure time or who practiced it less than once a week in the three months preceding the interview. Prevalence of active individuals for each domain was calculated for the total sample and for the sex, age and level of education sub-groups.

Prevalence of active individuals in leisure time was assessed according to the presence and type of place for physical activity close to the home. Crude and adjusted prevalence ratios were calculated for level of education and age for active individuals in leisure time.

Weighting factors attributed to each individual interviewed by VIGITEL were considered for all estimates, according to Moura et al (2008).¹⁶ To achieve this, the following were considered: the ratio of the number of adults and that of fixed telephone lines in each household; the relative percentage of a certain category (sex, age and level of education) in relation to the 2000 census distribution; and the sampling fraction of adults studied from the total number of adults living in each city in the 2000 census.

SPSS 15.0 and Stata 9.0 were used in all analyses.

As interviews were conducted by telephone, the informed consent form was replaced by verbal consent obtained during telephone contacts with interviewees. VIGITEL was approved by the *Comissão de Ética em Pesquisa em Seres Humanos do Ministério da Saúde* (Ministry of Health Human Research Ethics Committee).

RESULTS

Prevalence of inactive individuals in leisure time was higher than 60% in ten cities (Table 1).

Table 2 shows the prevalence of active individuals according to the sex, age and level of education domains. Men were more active than women in the leisure-time, occupational and transportation domains, and women were more active in heavy household cleaning. Young adults aged between 18 and 24 years and adults between 45 and 65 years were more active in leisure time than those aged between 25 and 44 years and those aged 65 years or older. Adults aged between 18 and 44 years practiced more physical activity at work. Physical activity practice in transportation was more frequent in adults aged up to 54 years, decreasing after this age. Household chore domain was more prevalent in adults aged between 25 and 64 years. Individuals with 12 or more years of schooling were more active in the leisure-time domain and less active at work, in transportation and in heavy household cleaning. In general, 76% of the adult population was active in at least one of the domains, and this percentage was higher in women, and lower in older individuals (≥ 65 years) and those with higher level of education (≥ 12 years of schooling). Of all active individuals, 61.1% are active in only one domain, 29.5% in two, 8.5% in three, and 0.8% in four domains.

Table 3 shows the prevalence of active individuals in leisure time, according to the practice of physical

Table 1. Frequency^a of inactive individuals in the leisure-time domain, according to Brazilian capitals, 2006.

Capital	Inactive individuals in the leisure time domain % (95% CI)
Aracajú	58.2 (56.6;60.9)
Belém	59.8 (57.8;62.0)
Belo Horizonte	57.1 (55.4;59.6)
Boa Vista	62.4 (60.5;65.0)
Brasília	51.0 (50.2;54.8)
Campo Grande	57.1 (55.1;59.4)
Cuiabá	59.2 (57.8;62.1)
Curitiba	54.0 (52.6;56.8)
Florianópolis	47.4 (46.0;50.3)
Fortaleza	58.3 (56.4;60.8)
Goiânia	58.1 (55.9;60.3)
João Pessoa	60.4 (58.8;63.1)
Macapá	62.6 (60.8;65.1)
Maceió	58.8 (57.8;62.1)
Manaus	58.3 (55.9;60.2)
Natal	60.7 (59.2;63.4)
Palmas	59.9 (59.1;63.3)
Porto Alegre	49.1 (47.2;51.6)
Porto Velho	58.7 (56.2;60.6)
Recife	62.4 (60.7;65.0)
Rio Branco	61.3 (59.2;63.6)
Rio de Janeiro	61.0 (58.4;62.6)
Salvador	58.8 (56.3;60.5)
São Luís	65.0 (62.8;67.0)
São Paulo	64.3 (62.4;66.5)
Teresina	68.2 (66.4;70.6)
Vitória	54.4 (52.4;56.7)
Total	59.9 (58.9;60.9)

^a Weighted values to adjust VIGITEL sample socio-demographic distribution to the adult population distribution of each city in the 2000 Demographic Census.

activities in the other domains. Prevalence of active individuals in leisure time was more frequent in those active in transportation, whereas there was an inversion for the other physical activity domains.

The presence of a place close to the home for leisure time activities increased this practice in both sexes, in all age groups and levels of education. The frequency of physical activity in leisure time was always higher in men, regardless of age and level of education (Table 4). After adjusting for age and level of education, the probability of being active in leisure time was approximately 1.7 times higher in men and 1.6 times in women who live close to an adequate place for physical activity, regardless of this being public or private (Table 5).

Table 2. Frequency^a of physically active individuals and physical activity domains, according to sex, age and level of education. Brazil, 2006.

Variable/Domain	Leisure-time % (95% CI)	Occupational % (95% CI)	Transportation % (95% CI)	Household % (95% CI)	At least one domain % (95% CI)
Sex					
Males	18.3 (17.8;18.8)	46.4 (46.0;47.0)	14.2 (13.8;14.6)	21.7 (21.1;22.2)	68.2 (67.6;68.7)
Females	11.9 (11.7;12.3)	31.2 (30.6;31.7)	9.6 (9.2;9.9)	71.4 (70.9;71.9)	82.6 (82.1; 83.0)
Age (years)					
18 to 24.9	18.3 (17.6;19.0)	36.9 (36.0;37.8)	13.6 (12.9;14.2)	45.2 (44.3;46.1)	77.4 (76.7;78.2)
25 to 34.9	15.7 (15.1;16.3)	43.7 (42.9;44.6)	13.6 (13.1;14.2)	50.5 (49.6;51.3)	80.0 (79.3;80.6)
35 to 44.9	11.9 (11.3;12.4)	45.5 (44.6;46.4)	12.9 (12.3;13.5)	51.7 (50.3;52.1)	79.0 (78.3;79.8)
45 to 54.9	13.3 (12.5;14.0)	41.3 (40.3;42.4)	12.0 (11.3;12.7)	51.7 (50.6;52.8)	77.6 (76.7;78.5)
55 to 64.9	16.0 (14.9;17.0)	29.3 (28.0;30.6)	6.9 (6.2;7.6)	50.4 (49.0;51.8)	74.9 (73.7;76.1)
65 and older	12.7 (11.8;13.7)	11.0 (10.1;11.8)	3.1 (2.6;3.6)	36.4 (35.1;37.8)	51.3 (49.9;52.7)
Level of education (years)					
0 to 8	12.1 (11.7;12.5)	39.5 (38.9;40.0)	14.1 (13.7;14.5)	53.4 (52.8;54.0)	78.6 (78.1;79.1)
9 to 11	17.4 (16.8;18.0)	38.1 (37.4;39.0)	10.4 (10.0;10.8)	50.6 (49.8;51.3)	78.2 (77.6;78.8)
12 or more	18.9 (18.1;19.7)	34.1 (33.2;35.1)	6.6 (6.1;7.1)	29.3 (28.3;30.2)	63.6 (62.6;64.5)
Total	14.8 (14.6;15.1)	38.2 (37.8;38.6)	11.7 (11.4;12.0)	48.5 (48.0;48.9)	75.9 (75.6-76.3)

^a Weighted values to adjust VIGITEL sample sociodemographic distribution to the adult population distribution of each city in the 2000 Demographic Census.

Practice of physical activities in the occupational domain was inversely associated with physical activity in leisure time, whereas physical activities in the transportation domain were positively associated with physical activity in leisure time in men. After adjustment for age and level of education, the probability of being active in leisure time among those considered inactive at work was 1.2 times higher for men and women. For men who had been categorized as active in transportation, the probability of being active in leisure time was 1.3 times higher.

DISCUSSION

This is the first population-based epidemiological study in Brazil that assessed different domains of physical activity separately. In addition, it is part of the baseline for future studies that monitor physical activity trends in Brazil by VIGITEL, which should be maintained in the next years.¹⁶

Men were more active in the leisure-time, occupational and transportation domains, whereas women were more active in heavy household cleaning. The older an individual is, especially from 55 years onwards,

Table 3. Frequency^a of active individuals in the leisure-time domain, according to physical activity level in the occupational, transportation and household domains. Brazil, 2006.

Physical activity domain	Total sample % (95% CI)	Men % (95% CI)	Women % (95% CI)
Occupational			
No	15.6 (14.8;16.4)	19.9 (18.4;21.5)	12.7 (11.9;13.5)
Yes	13.7 (12.5;14.9)	16.4 (14.5;18.2)	10.3 (8.9;11.6)
Transportation			
No	14.5 (13.8;15.2)	17.7 (16.5;18.9)	11.9 (11.2;12.6)
Yes	17.4 (14.9;19.8)	21.6 (17.8;25.3)	12.0 (9.6;14.5)
Household			
No	16.5 (15.6;17.5)	18.3 (16.9;19.6)	12.4 (11.2;13.6)
Yes	13.1 (12.3;13.9)	18.4 (16.2;20.5)	11.7 (10.9;12.6)

^a Weighted values to adjust VIGITEL sample sociodemographic distribution to the adult population distribution of each city in the 2000 Demographic Census.

Table 4. Frequency^a of sufficiently active individuals in the leisure-time domain, according to the presence of public place for physical activity in leisure time close to the home, according to sex, age and level of education. Brazil, 2006.

Variable	Presence of place		Public place	
	Yes % (95% CI)	No % (95% CI)	Yes % (95% CI)	No % (95% CI)
Sex				
Males	20.2 (19.7;20.8)	11.6 (10.8;12.5)	19.9 (19.3;20.5)	22.8 (21.0;24.6)
Females	13.3 (12.9;13.8)	7.9 (7.3;8.5)	13.1 (12.6;13.6)	14.8 (13.5;16.2)
Age (years)				
18 to 24.9	20.2 (19.4;21.1)	12.1 (10.9;13.3)	19.5 (18.6;20.4)	25.6 (23.0;28.1)
25 to 34.9	17.5 (16.8;18.2)	10.1 (9.1;11.2)	17.2 (16.4;17.9)	19.8 (17.7;22.0)
35 to 44.9	13.1 (12.4;13.8)	7.7 (6.7;8.7)	13.1 (12.4;13.9)	13.1 (11.1;15.2)
45 to 54.9	14.6 (13.7;15.4)	8.9 (7.6;10.2)	14.3 (13.4;15.2)	16.5 (13.7;19.3)
55 to 64.9	18.5 (17.2;19.8)	8.9 (7.3;10.5)	18.9 (17.5;20.2)	14.4 (10.6;18.3)
65 and more	14.8 (13.6;16.0)	7.8 (6.4;9.2)	15.2 (14.0;16.5)	11.1 (7.7;14.4)
Level of education (years)				
0 to 8	13.5 (13.1;14.0)	8.5 (7.9;9.2)	13.3 (12.8;13.8)	15.5 (14.0;17.1)
9 to 11	19.3 (18.6;20.0)	11.0 (10.0;12.0)	19.1 (18.4;19.8)	20.8 (18.7;22.9)
12 or more	20.5 (19.6;21.4)	10.9 (9.4;12.5)	20.6 (19.6;21.6)	20.0 (17.8;22.2)
Total	16.6 (16.2;16.9)	9.5 (9.0;10.0)	16.4 (16.0;16.7)	18.3 (17.2;19.4)

^a Weighted values to adjust VIGITEL sample sociodemographic distribution to the adult population distribution of each city in the 2000 Demographic Census.

the lower the physical activity levels in all domains are. People with a higher level of education were more active in leisure time and more inactive at work, transportation and heavy household cleaning. People who were inactive at work were more active in leisure time, while active men in transportation were more active in leisure time. The presence of an adequate place for physical activity close to the home was associated with physical activity practice in leisure time.

Prevalence of physical activity in the domains increased in the following order: transportation, leisure-time, occupational and household domains. A similar pattern was observed for adults in the city of São Paulo, Southeastern Brazil, based on the application of the International Physical Activity Questionnaire (long IPAQ version).⁶ The authors used the cut-off point of 150 minutes of physical activities in each domain and found prevalences of 8.3% of active individuals in transportation, 22.5% in leisure time, 31.1% at work, and 43.3% in household chores.

Surveys conducted in middle- and low-income countries, such as Brazil, Peru, Mexico, Albania and Baltic countries, showed that, in the leisure-time domain, the frequency of insufficiently active adults is higher than 50%.^{2,11,14,19,22,23} In high-income countries, such as the United States, Germany, England and Australia, prevalences varied between 25% and 62%.^{1,3,5,6,12,17,21}

A Behavioral Risk Factors Surveillance System (BRFSS) survey conducted in 2006, with a sample of 50 U.S. states, in addition to the District of Columbia,

Virgin Islands and Puerto Rico, showed prevalences of physical inactivity in leisure time between 14.2% and 41.2%;¹² thus, lower than those found in all Brazilian state capitals and the Federal District.

The differences observed between men and women in the leisure-time domain were similar to those observed by Monteiro et al (2003),¹⁴ in a representative sample of the Southeast and Northeast regions, and by Dias-da-Costa et al (2005),² in a sample of adults in Southern Brazil. Most of the literature of high-income countries, such as the United States, Australia and England, and middle- and low-income countries, such as Peru and the Baltic countries, confirmed that men are more active in leisure time than women.^{5,17,19,22}

In the present study, men were also more active than women in transportation activities, although the frequency of active women in household chores was three times higher than that of men. Likewise, Florindo et al (2009)⁶ showed that men were more active in leisure time, at work and in transportation, while household chores significantly increased the physical activity level in women.

The present study showed a reduction in physical activity practice in the occupational and transportation domains from the age of 55 years onwards, and in the leisure-time and heavy household cleaning domains from 65 years onwards. Studies in Brazil,^{2,14} Spain,³ Germany,²¹ Baltic countries¹⁹ and Australia¹⁷ showed a reduction in physical activity practice in leisure

Table 5. Crude and adjusted prevalence ratio^a for the practice of physical activities recommended in leisure time, according to the presence of place close to the home, type of place, age group, level of education and other physical activity domains. Brazil, 2006.

Variable	Men		Women	
	Crude PR (95% CI)	Adjusted PR (95% CI) ^b	Crude PR (95% CI)	Adjusted PR (95% CI) ^b
Presence of place close to the home ^b				
No	1	1	1	1
Yes	1.74 (1.46;2.08)	1.67 (1.39;2.00)	1.69 (1.45;1.99)	1.63 (1.40;1.91)
Public place ^b				
No	1	1	1	1
Yes	0.87 (0.70;1.09)	0.93 (0.75;1.17)	0.88 (0.72;1.09)	0.90 (0.73;1.12)
Age (years) ^c				
18 – 24.9	1	1	1	1
25 – 34.9	0.67 (0.55;0.80)	0.67(0.56;0.80)	1.36 (1.11;1.66)	1.38 (1.13;1.67)
35 – 44.9	0.43 (0.36;0.53)	0.44 (0.36;0.53)	1.19 (0.99;1.43)	1.20 (1.00;1.44)
45 – 54.9	0.49 (0.40;0.61)	0.50 (0.41;0.62)	1.32 (1.08;1.61)	1.37 (1.12;1.67)
55 – 64.9	0.73 (0.57;0.92)	0.77 (0.61;0.99)	1.31 (1.06;1.61)	1.44 (1.16;1.79)
≥ 65	0.62 (0.49;0.79)	0.70 (0.55;0.90)	1.01 (0.82;1.25)	1.17 (0.94;1.45)
Level of education (years) ^d				
0 – 8	1	1	1	1
9 – 11	1.55 (1.33;1.80)	1.44 (1.23;1.69)	1.32 (1.16;1.51)	1.33 (1.16;1.54)
≥ 12	1.58 (1.35;1.85)	1.61 (1.38;1.88)	1.51 (1.31;1.74)	1.43 (1.22;1.66)
Active at work ^b				
Yes	1	1	1	1
No	1.22 (1.06;1.39)	1.21 (1.05;1.38)	1.23 (1.06;1.42)	1.22 (1.06;1.41)
Active in the household ^b				
Yes	1	1	1	1
No	0.99 (0.86;1.14)	0.97 (0.84;1.12)	1.06 (0.93;1.19)	0.93 (0.81;1.05)
Active in transportation ^b				
Yes	1	1	1	1
No	1.22 (1.01;1.47)	1.26 (1.04;1.52)	1.01 (0.81;1.25)	1.07 (0.86;1.33)

^a Weighted values to adjust VIGITEL sample sociodemographic distribution to the adult population distribution of each city in the 2000 Demographic Census.

^b Analyses adjusted for age and level of education

^c Analyses adjusted for level of education

^d Analyses adjusted for age

time with age. The same pattern was found for physical activity at work in Australia,²⁰ Albania²³ and the United States,¹ and for physical activity in the four domains in Brazil,⁶ Colombia⁸ and other 51 middle- and low-income countries.⁹

The positive association between level of education and physical activity practice in leisure time has been observed in Brazil^{2,14} and in countries such as Peru,²² Baltic countries,¹⁹ Mexico¹¹ and in high-income countries as well.^{1,3,5,20} In the present study, activities performed at work, in transportation and heavy household cleaning were those that most contributed for the

physical activity level in individuals with lower level of education. In a study with North American women with low level of education, higher inactivity in leisure time and higher physical activity at work and in household chores were observed.²⁴ In the city of São Paulo, the higher the level of education, the more active individuals were in leisure time and the less active they were at work and in household chores.⁶ In the city of Pelotas, Southern Brazil, Hallal et al (2003)¹⁰ showed a linear trend of protection against complete physical inactivity as economic conditions decreased, i.e. poorer individuals were more protected against complete physical inactivity.

The relationship between physical activities in leisure time and other types of physical activity is still controversial. In the present study, higher prevalence of active individuals in leisure time was found in men who were active in transportation. Inverse association was found between active individuals at work and practice of physical activities in leisure time in both sexes. A study with North American adults (National Health and Nutrition Examination Survey – NHANES, 1999-2000)²⁵ showed positive association between physical activities at work and in leisure time, especially among men.

In a study with young adults aged between 18 and 29 years in Colombia,⁷ it was observed that the practices of both walking and cycling as a way of transportation were associated with the practice of physical activities in leisure time, results which were confirmed in the present study. Such positive association is relevant for public health, once the joint promotion of these two domains is feasible to establish future interventions.

From the point of view of public policies, observing that places suitable for the practice of physical activities close to the home significantly contribute to this practice is an important finding to subsidize the planning of actions that encourage these practices in leisure time. In a meta-analysis study on perceived environment and physical activity, there was a posi-

tive association between the presence of facilities for physical activities and their practice.⁴ Another study with adults showed that places for recreation which are up to 1,500 meters away from homes are positively associated with the practice of physical activities in leisure time.¹³

The main limitation to this study is similar to that of the entire telephone-based surveillance system and refers to the exclusion of individuals who reside in households without a fixed telephone line. According to Moura et al (2008),¹⁶ although having increased in the last years, fixed telephone network coverage is not universal; it can be low in less developed cities and in strata with lower socioeconomic level.

Results from the present study are important to monitor physical activity levels in Brazil from 2006 onwards and to understand the behavior of different physical activity domains, according to sociodemographic and environmental characteristics. Interventions to promote physical activities deserve to be prioritized in public health in Brazil. More than 300 cities include physical activity promotion interventions and healthy diet promotion by the Ministry of Health. Such initiative, in addition to large-scale interventions existing in this country, can contribute to promote healthier lifestyles for the Brazilian population.

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