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Adult physical activity levels and associated factors in rural communities of Minas Gerais State, Brazil

ABSTRACT

OBJECTIVE: To estimate the physical activity level and its association with sociodemographic factors in adults living in rural areas.

METHODS: Cross-sectional population study including 567 adults in two rural communities from the Jequitinhonha Valley, Southeastern Brazil, during the years of 2008 and 2009. Physical activity levels were assessed with the adapted long version of the International Physical Activity Questionnaire. A cut-off point of 150 minutes per week was used in the analyses for the domains: occupational, household, leisure and commuting. The sociodemographic factors studied were sex, skin color, age, marital status, education and self-reported health. Bivariate analysis (chi-square test, $p \leq 0.05$) and multiple logistic regression analysis were performed.

RESULTS: The prevalence of subjects practicing 150 min/wk or more of work related physical activity was 82.9% (95% CI: 77.8;88.0) of those currently working. The equivalent proportions for the other domains were: household 63.5% (95% CI: 59.6; 67.4); leisure time 10.1% (95% CI: 7.6;12.6) and commuting 32.0% (95% CI: 28.2;35.8%). Men were more active than women in leisure time, commuting and occupational domains, while women were more active in the household domain. Leisure time physical activity was more prevalent in younger subjects, those with higher levels of education and among those of black or mixed skin color. Commuting physical activity was more frequent among younger women and among men and women in excellent/good health. Men with higher level of schooling were less active in the commuting domain.

CONCLUSIONS: The prevalence of physically active adults in this rural area was high, but the levels of leisure time physical activity were low and followed patterns similar to those observed in urban areas, in relation to age, sex and educational status.

DESCRIPTORS: Adult. Motor Activity. Leisure Activities. Activities of Daily Living. Walking. Rural Population. Socioeconomic Factors. Cross-Sectional Studies.

INTRODUCTION

The overall increase in non-communicable diseases and conditions constitutes a global public health problem. In this context, the practice of physical activity stands out as a form of health promotion and a way to prevent these diseases.[a] Worldwide estimates from the World Health Organization (WHO), in 2002,

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[a] Ministério da Saúde. Instituto Nacional do Câncer. Inquérito domiciliar sobre comportamento de risco e morbidade referida de doenças e agravos não transmissíveis [internet]. [cited 23 Aug 2007]. Available from: http://www.inca.gov.br/inquérito

indicated inactivity was responsible for almost two million annual deaths, for 22% of ischemic heart disease and for 10% to 16% of the cases of diabetes mellitus and breast, colon and rectal cancers. This data was mainly obtained from urban populations.[b]

Few population-level studies were performed in rural areas. Studies show that these communities also have a high prevalence of non-communicable diseases and conditions, despite their more active lifestyle.[1,15,25]

Knowing the physical activity levels of different populations allows for promoting physical activity by developing public policies adapted to the social, environmental and cultural contexts of each population. Measuring physical activity levels has proved challenging in population studies, including in regards to the comparability of studies.[12] Also, it is hard to measure the activities performed in the different physical activity domains – leisure, commuting, occupational and household – with equal precision.[13]

Studies about physical activity levels in rural communities present additional challenges related to cultural differences, low education, poverty and difficult access to health services. In two published studies of adults, only physical activity in the leisure time domain was evaluated. In the Northeast and Southeast regions of Brazil, close to 1% of adults living in rural areas engaged in 30 minutes of daily exercise or sport.[18] Another study, with perimenopausal women in Rio Grande do Norte, northern region, found that 37% engaged in 40 minutes of physical activity at least three days per week.[24]

The objective of this study was to estimate the physical activity levels of a rural population and evaluate the associated sociodemographic factors.

METHODS

The cross-sectional population study was performed in the communities of Virgem das Graças and Caju in Jequitinhonha Valley, state of Minas Gerais, Southeastern Brazil. The population lives from mostly mixed subsistence farming and cattle raising, with corn and manioc as staples foods. The main sources of income are remittances from migrant workers and sales of small quantities of milk and manioc, in addition to the receipt of retirement pay, pensions and assistance from the government.[8] The population has participated in several studies since 2001. One of these was about schistosomiasis and other parasitic infections[8] and, starting in 2004, about non-communicable chronic diseases and their risk factors.[25]

The data were collected from May of 2008 until May of 2009, by rigorously trained undergraduate and graduate students. Interviews were performed face-to-face with a questionnaire.

All 612 individuals met the eligibility requirements of 18 or more years of age and living at least one year in the communities. These people were invited to visit a health clinic to participate in the study. The more distant households of the rural villages were visited by the researchers. There were 45 individuals (7.4%) categorized as losses, who during the data collection period were traveling, had physical or mental problems that made data collection difficult, were pregnant or refused.

The response variable was the practice of physical activity, measured with the long version of the International Physical Activity Questionnaire (IPAQ).[c] The IPAQ is an international tool for obtaining estimates of physical activity that are comparable across different populations. The questionnaire was developed by specialists in the field with the help of the World Health Organization and the Centers for Disease Control and Prevention (CDC). The long version of the IPAQ evaluates physical activity in the four domains – occupational, household, leisure time and commuting – according to the frequency and the duration of the physical activity performed in each domain during a usual week. The activities are separated according to their intensity, which is defined as the distinction between walking, other moderate physical activities and vigorous physical activities. Moderate activities are those that cause a small increase in respiratory frequency and require moderate physical exertion, and vigorous activities cause more rapid breathing than normal, with considerable physical exertion.[5] Individuals that practiced 150 minutes or more of weekly physical activity were considered active.[14,21] This duration was calculated by multiplying the number of days of moderately intense physical activity or walking by the number of minutes per day spent in each activity. The minutes of vigorous physical activity were multiplied by two, in addition to the aforementioned formula.

The long IPAQ was adapted to the rural area as recommended by its authors.[c] The adaptation consisted of small changes in the physical activities of each domain, without changing the structure of the questionnaire. For example, the activity of attending to a gym, utilized in the original questionnaire, was substituted by the activities of swimming in the river, weeding and hoeing. In the communities studied the predominant occupation involves physical exertion in agriculture, and a large part of the population lives from subsistence agriculture. Therefore, these activities in the occupational and household domains can overlap. In this case,

[b] World Health Organization. Reducing risks, promoting healthy life. Geneva; 2002. (World health report 2002).
[c] International Physical Activity Questionnaire. Available from: http://www.ipaq.ki.se/ipaq.htm

agricultural work is related to daily household tasks, and therefore, some physical activities performed outside the home were considered as part of household activities, including activities in the backyard/porch in urban areas, and the yard/farmland in rural areas. The adapted questionnaire was tested in a pilot study in a rural area of the Paraopeba river valley, in the Belo Horizonte metropolitan area, Southeastern Brazil.

The independent variables were sex, skin color (white, mixed, black), age (18-30, 31-45, 46-59, ≥ 60 years), marital status (married/in a union, single, separated/ divorced/widowed), education (0, 1-4, 5-8, ≥ 9 years of study) and self-reported health (excellent/good and regular/poor). Sex and skin color were provided by the interviewers. Age was confirmed through birth date and verified with an identity document or birth certificate. The other variables were provided by the participants.

The data were inserted with double entry in Epi Info 2000. The statistical analyses were performed using Stata 9.0. For the bivariate analysis, a chi-square test was used to verify differences in the proportion of active people, according to the independent variables. Results were considered statistically significant when $p \leq 0.05$. Multiple logistic regression analysis was also performed with an estimated odds ration (OR) and 95% confidence interval (95% CI), and the results did not differ from the observations of the bivariate analysis. It was decided to present the findings of the bivariate analysis.

The study was approved by the Research Ethics Committee of the Universidade Federal de Minas Gerais (UFMG), appearance nº ETIC 604/07 of February 18, 2008. All participants signed an informed voluntary consent form, after agreeing to participate in the study.

RESULTS

There were 567 people interviewed in the two communities. Table 1 presents the characteristics of the study population. The age group of 45 to 59 years percentage was the smallest among men and women. More than half the population was classified as mixed skin, reported to be married or living with a partner and described their health as excellent/good. About 40% of the population reported having one to four years of schooling. The number of non-responses for the variables used was low. The greatest number of non-responses (15) occurred for the variable of self-reported health.

Table 1. Characteristics of the adult population living in a rural area. State of Minas Gerais, Southeastern Brazil, 2008-2009.

Variable	Total population		Men		Women	
	n	%	n	%	n	%
Age[a] (years)						
18 to 30	152	26.8	68	24.8	84	28.8
31 to 45	165	29.2	81	29.5	84	28.8
46 to 59	101	17.8	50	18.3	51	17.5
≥ 60	148	26.2	75	27.4	73	24.9
Skin color						
White	186	32.8	77	28.0	109	37.3
Mixed	327	57.7	169	61.5	158	54.1
Black	54	9.5	29	10.5	25	8.6
Marital status						
Married / in a union	374	66.0	186	67.6	188	64.3
Single	127	22.4	67	24.4	60	20.6
Separated/ divorced/ widowed	66	11.6	22	8.0	44	15.1
Self-reported health[a]						
Excellent / good	337	61.1	167	63.3	170	59.0
Regular / bad	215	38.9	97	36.7	118	41.0
Education[a] (years)						
0	168	29.8	87	32.0	81	27.7
1 to 4	240	42.6	125	45.9	115	39.4
5 to 8	78	13.8	35	12.9	43	14.7
≥ 9	78	13.8	25	9.2	53	18.2
Total	567	100.0	275	48.5	292	51.5

[a] Missing values: 1 one; self-reported health, 15; education, 3.

The prevalence of participants reporting at least 150 minutes of weekly physical activity were: 30.8% (95% CI: 27.0;34.6) in the occupational domain, when using total population as the denominator, and 82.9% (CI 95%: 77.8;88.0), when using only those currently working at the time of the interview as the denominator; 63.5% (CI 95%: 59.6;67.4) in the household domain; 10.1% (95% CI: 7.6;12.6) in the leisure domain; and 32.0% (95% CI: 28.2;35.8) in the commuting domain. When combining all the physical activity domains, 86.5% (95% CI: 83.7;89.4) of participants reported practicing 150 minutes or more of weekly physical activity.

In regards to sex, the percentage of individuals that attained 150 minutes of activity in leisure and commuting was three times greater among men compared to women. In the occupational domain, the prevalence was 29% greater for men. In the household domain, women were 42% more active (Figure).

In relation to occupational physical activity (Table 2), a greater percentage of participants in the 46 to 59 year age group performed at least 150 minutes, without differences in regards to sex. Participants with mixed or black skin had a greater chance of reaching 150 minutes of occupational physical activity. There was an inverse relationship between education and the percentage of participants performing 150 minutes at work, except when women were evaluated separately. A higher percentage of women, performing 150 minutes of occupational physical activity, classified their health as regular or poor. Marital status was not significantly associated with occupational physical activity.

Household physical activity was more frequent in older men and in younger women (Table 3). Mixed/black skin color was associated with a higher level of household physical activity only among women. Education had an inverted U shaped association with the practice of household physical activity, in the total population and in women. People, who are married or in stable unions, showed higher levels of household physical activity in the total population and among women. Self-reported health was not associated with greater physical activity levels in the household domain.

Leisure time physical activity was more frequent in individuals with greater education, lower age and among those of black or mixed color (Table 4). Single men and women with excellent/good health had higher levels of physical activity in this domain.

In the commuting domain, younger women were more active. Men and women that described health status as excellent/good showed more active commuting. Men with higher education were the least active in this domain. Marital status and skin color were not associated with commuting physical activity (Table 5).

Table 2. Proportion of individuals that performed at least 150 minutes of weekly physical activity in the occupational domain according to sociodemographic variables. State of Minas Gerais, Southeastern Brazil, 2008-2009.

Variable	Total population			Men			Women		
	n	%	p	n	%	p	n	%	p
Age (years)									
18 to 30	55	73.3	0.040	44	81.5	0.302	11	52.4	0.057
31 to 45	66	85.7		52	92.9		14	66.7	
46 to 59	39	92.9		29	90.6		10	100.0	
≥ 60	13	86.7		12	85.7		01	100.0	
Skin color									
White	44	74.6	0.047	34	82.9	0.256	10	55.6	0.167
Mixed/ Black	130	86.1		104	89.7		26	74.3	
Education (years)									
0	32	91.4	<0.001	28	93.3	<0.001	04	80.0	0.086
1 to 4	92	93.9		77	95.1		15	88.2	
5 to 8	28	80.0		25	89.3		03	42.9	
≥ 9	22	52.4		08	44.4		14	58.3	
Marital status									
Married/ in a union	112	83.6	0.788	87	86.1	0.420	25	75.8	0.281
Single	49	80.3		41	89.1		08	53.3	
Separated/divorced/widowed	13	86.7		10	100.0		03	60.0	
Self-reported health									
Excellent/ Good	114	80.9	0.454	93	88.6	0.486	21	58.3	0.039
Regular/ Bad	52	85.3		38	84.4		14	87.5	

The majority of associations observed through bivariate analysis were also found in the logistic regression analysis, except for those with positive confounding effects. There was a lack of association between education and household physical activity, between age and leisure time among women and between marital status and leisure time physical activity. The multiple regression analysis showed a direct association between commuting physical activity and age of men, which was not observed in the bivariate analysis.

DISCUSSSION

The results of this study showed that 10.1% of participants reported performing at least 150 minutes/week of walking or other moderate to intense physical activities as leisure activities. Leisure time physical activity is recognized and recommended for its health benefits,[14,21] and their low prevalence in this population, together with the high prevalence of overweight, obesity, hypertension and dyslipidemia present in these communities,[23] can harm the health of people in rural areas in the future.

In the Living Standards Survey[18] that included urban and rural population in the Northeast and Southeast Brazilian regions, the prevalence of leisure time physical activity was low (0.9%) among adults living in rural areas, even though it was estimated with another tool. When urban and rural areas were compared, men in rural areas were less likely to reach the recommended 30 minutes of physical activity on at least five days per week.[18] Comparisons of urban and rural areas in

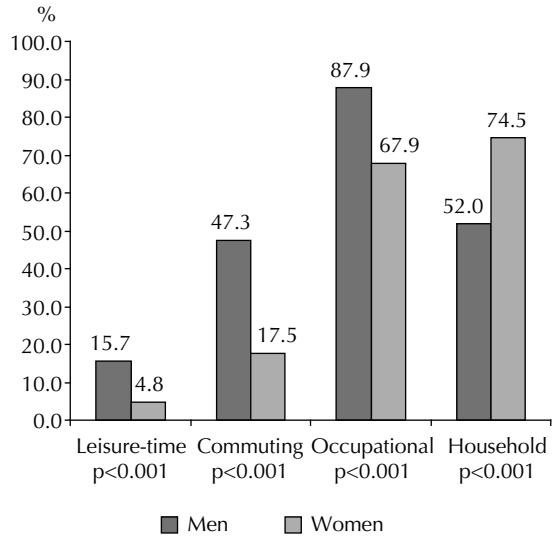

Figure. Proportion of individuals that performed at least 150 minutes of weekly physical activity by sex and domain. Minas Gerais, Southeastern Brazil. 2008-2009.

Table 3. Proportion of individuals that performed at least 150 minutes of weekly physical activity in the household domain according to sociodemographic variables. State of Minas Gerais, Southeastern Brazil, 2008-2009.

Variable	Total population			Men			Women		
	n	%	p	n	%	p	n	%	p
Age (years)									
18 to 30	89	58.6	0.143	28	41.2	0.024	61	72.6	<0.001
31 to 45	114	69.1		38	46.9		76	90.5	
46 to 59	68	67.3		27	54.0		41	80.4	
≥ 60	87	59.6		49	65.3		38	53.5	
Skin color									
White	110	59.5	0.160	38	49.4	0.583	72	66.7	0.019
Mixed/ Black	249	65.5		105	53.0		144	79.1	
Education (years)									
0	94	56.6	0.006	50	57.5	0.133	44	55.7	<0.001
1 to 4	167	69.6		66	52.8		101	87.8	
5 to 8	54	69.2		16	45.7		38	88.4	
≥ 9	41	52.6		08	32.0		33	62.3	
Marital status									
Married/ in a union	251	67.1	0.032	99	53.2	0.108	152	80.9	0.002
Single	69	54.3		29	43.3		40	66.7	
Separated/divorced/widowed	39	60.9		15	68.2		24	57.1	
Self-reported health									
Excellent/ Good	212	63.1	0.741	81	48.5	0.148	131	77.5	0.157
Regular/ Bad	138	64.5		56	57.7		82	70.1	

Table 4. Proportion of individuals that performed at least 150 minutes of weekly physical activity in the leisure time domain according to sociodemographic variables. State of Minas Gerais, Southeastern Brazil, 2008-2009.

Variable	Total population			Men			Women		
	n	%	p	n	%	p	n	%	p
Age (years)									
18 to 30	33	21.7	<0.001	25	36.8	<0.001	08	9.5	0.042
31 to 45	15	9.1		12	14.8		03	3.6	
46 to 59	05	5.0		02	4.0		03	5.9	
≥ 60	04	2.7		04	5.3		00	0.0	
Skin color									
White	12	6.5	0.046	08	10.4	0.135	04	3.7	0.487
Mixed/ Black	45	11.8		35	17.7		10	5.5	
Education (years)									
0	04	2.4	<0.001	04	4.6	<0.001	00	0.0	0.001
1 to 4	18	7.5		13	10.4		05	4.4	
5 to 8	12	15.4		11	31.4		01	2.3	
≥ 9	21	26.9		13	52.0		08	15.1	
Marital status									
Married/ in a union	26	7.0	<0.001	19	10.2	<0.001	07	3.7	0.098
Single	27	21.3		21	31.3		06	10.0	
Separated/divorced/widowed	04	6.1		03	13.6		01	2.3	
Self-reported health									
Excellent/ Good	38	11.3	0.198	26	15.6	0.982	12	7.1	0.037
Regular/ Bad	17	7.9		15	15.5		02	1.7	

other populations showed that residents of urban areas were more active than those in rural areas. Only in the Southern region of the United States was there no difference between rural and urban areas.[16] On the other hand, a Chinese study with individuals aged 35-74 years showed that 78.1% of rural residents were active in the leisure and occupational domains, in contrast to 66.3% in the urban area.[20] These differences can be explained through two main factors. In first place, the characteristics of rural communities are very different between countries and, in the case of Brazil, between regions. Rural activities in the occupational domain can differ greatly in the extent of mechanization and in the type of activity performed (e.g. extensive, family or subsistence agriculture; cattle raising; aquaculture; beekeeping; plant extraction and mineral extraction, among others). In addition, studies that only evaluate leisure time physical activity tend to produce discrepant results from studies that investigate other domains of physical activity. As observed in the present study, a large percentage of residents of rural areas concentrate their physical activity in other domains, such as occupational and household.

The associations, in this study between physical activity and sex, generally replicate the pattern observed in urban areas, where men are more active than women in the leisure time domain.[19,d] Two Brazilian studies analyzed the prevalence of physical activity in the four domains. In one of the studies, the pattern of physical activity, in relation to the sex of elderly people in Santa Catarina state, southern region, was similar to the present study's pattern for adults in the different domains. Women were more active than men only in household physical activities.[3] In the other study, performed with adults (18 years of age or greater) and utilizing the System of Chronic Disease Surveillance by Telephone Interview (VIGITEL), there were no physical activity differences in the commuting domain between the sexes, and the frequency of people active in this domain was less than 10%.[6] When evaluating the prevalence of total physical activity, some Brazilian studies did not find differences between the sexes in urban areas.[2,10]

The frequency of people active in the leisure domain decreased with age in this study. A study in a rural area of China showed the same trend.[20] Nonetheless, in a study of rural communities in Missouri, United States, the elderly more frequently performed walks than younger individuals.[4] Other studies gathered information on the different domains of physical activity but

[d] Ministério da Saúde. Secretaria de Vigilância à Saúde. Secretaria de Gestão Estratégica e Participativa. Vigitel Brasil 2008: vigilância de fatores de risco e proteção para doenças crônicas por inquérito telefônico. Brasília, DF; 2009.

Table 5. Proportion of individuals that performed at least 150 minutes of weekly physical activity in the commuting domain according to sociodemographic variables. State of Minas Gerais, Southeastern Brazil, 2008-2009.

Variable	Total population			Men			Women		
	n	%	p	n	%	p	n	%	p
Age (years)									
18 to 30	53	34.9	0.006	31	45.6	0.200	22	26.2	0.001
31 to 45	66	40.0		46	56.8		20	23.8	
46 to 59	27	26.7		21	42.0		06	11.8	
≥ 60	34	23.0		31	41.3		03	4.1	
Skin of color									
White	51	27.4	0.108	33	42.9	0.360	18	16.5	0.741
Mixed/ Black	130	34.1		97	49.0		33	18.0	
Education (years)									
0	50	29.8	0.036	42	48.3	0.010	08	9.9	0.159
1 to 4	90	37.5		66	52.8		24	20.9	
5 to 8	24	30.8		17	48.6		07	16.3	
≥ 9	16	20.5		04	16.0		12	22.6	
Marital status									
Married/ in a union	120	32.1	0.082	90	48.4	0.788	30	16.0	0.084
Single	47	37.0		31	46.3		16	26.7	
Separated/divorced/widowed	14	21.2		09	40.9		05	11.4	
Self-reported health									
Excellent/ Good	126	37.4	<0.001	88	52.7	0.009	38	22.4	0.013
Regular/ Bad	48	22.3		35	36.1		13	11.0	

did not separate the domains and the associations with variables such as sex and age.[9,17]

In agreement with studies of urban areas in Brazil, individuals with greater education in the rural areas of Minas Gerais were also more active in the leisure domain.[2,22,d] In a study in China, though, an association was not identified between education and leisure time physical activity in urban or rural areas.[20] In the occupational domain, there was an inverse relationship between education and physical activity: in the rural area of Minas Gerais, people with greater education were less active at work. These findings also occurred in urban and rural areas of China and agree with Brazilian data from studies in urban areas.[7] People with more schooling are more active in leisure time. This may be related to a different relationship with work, which may allow for greater time availability and access to leisure activities. On the other hand, this study found a higher percentage of individuals with low education, who performed at least 150 minutes of physical activity in the occupational domain. This result can be attributed to the fact that labor activities involving greater physical force do not generally require greater education level.

Despite increased epidemiological studies over the past decades on physical activity in Brazil among urban populations, such as adults, children, adolescents and university students, studies did not exist with the specific goal of measuring physical activity in the different domains among rural populations. Since work is predominantly performed with physical exertion in subsistence agriculture, the activities in the occupational and household domains can be merged. The modifications to the questionnaire do not fundamentally alter it, but comparisons between studies in urban areas and those in rural areas should be interpreted with care.

The study limitations should be considered. The cross-sectional design does not allow for studying the relationship of time upon the variables; therefore, a phenomenon can occur through reverse causality. In regards to the external validity, the population studied may not represent other rural areas of Brazil and the world. In conclusion, the prevalence of individuals active in the leisure domain was low, with women three times less active than men. This demonstrates that interventions and public policies to encourage leisure time physical activity should be established for these populations. Interventions such as walking groups, collective games and gyms – modeled on the "The City's Gym" program – could include men and women of various age groups and education levels. The City's Gym program was established by the Recife

Department of Health, Northeastern, Brazil, in 2002 as a health promotion policy and emphasized physical activity leisure time and healthy food. It is currently being implemented in various Brazilian municipalities, including Belo Horizonte.

Studies are needed to identify personal, environmental and sociocultural factors that interfere with the practice of physical activity by these populations. With this information, necessary and appropriate interventions to the reality of rural communities can be implemented.

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