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Physical activity in a rural community in Colombia

Actividad física en una comunidad rural de Colombia

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ABSTRACT

Objective To characterize physical activity profiles in a rural community in the southwest of Colombia and to identify knowledge gaps on this issue in the country. **Methods** Cross-sectional study conducted in a rural area in Puerto Caldas, Pereira, Risaralda. The population of the study was obtained by convenience sampling from people participating in the activities of the Second Multidisciplinary Camp for Research and Services (CUMIS, for its acronym in Spanish), which was organized by the Colombian Association of Medical Students' Scientific Societies (ASCEMCOL, for its acronym in Spanish). The International Physical Activity Questionnaire (IPAQ) was used in order to measure and classify the physical activity behaviors of this population. **Results** Data from 100 subjects with a mean age of 43±18 years were collected. 6 % of the population did not perform any kind of physical activity, while 61 % performed vigorous physical activity. Men spent more time in doing vigorous and moderate physical activity than women did ($p<0.05$). The World Health Organization (WHO) recommendations on physical activity were followed by 72.29 % (n=60) and 82.35 % (n=14) of the people with an age of 18 to64 and ≥65 years, respectively. **Conclusion** It is necessary to build up evidence regarding physical activity in rural areas in order to implement public policies that promote its practice in communities where socioeconomic and health inequities exist. Part of the population living in the community where the study was carried out does not follow the WHO recommendations on physical activity; therefore, the lack of public health interventions is highlighted. A better coherence between international resolutions, national public policies and their implementation could lead to an increase in practice levels of physical activity.

Key Words: Motor activity, exercise, life style, rural population, health promotion, public policy (*source: MeSH, NLM*).

RESUMEN

Objetivo Caracterizar la actividad física en una comunidad rural del suroeste de Colombia e identificar los vacíos de conocimiento alrededor del tema en el país.
Métodos Estudio de corte transversal en una zona rural de Puerto Caldas, Pereira, Risaralda. La población fue seleccionada, mediante muestreo por conveniencia, entre las personas que participaron en las actividades del II Campamento Multidisciplinar de Investigación y Servicios (CUMIS), dirigido por la Asociación Colombiana de Sociedades Científicas de Estudiantes de Medicina (ASCEMCOL). Se utilizó el International Physical Activity Questionnaire (IPAQ) para medir y clasificar los comportamientos de esta población en términos de actividad física.
Resultados Se recogieron datos de 100 sujetos con edad promedio de 43±18 años. El 6 % de la población no realizó ningún tipo de actividad física, mientras que el 61 % realizó actividad física vigorosa. Los hombres dedicaron más tiempo a la práctica de actividad física vigorosa y moderada que las mujeres ($p<0,05$). Las recomendaciones sobre actividad física de la Organización Mundial de la Salud (OMS) fueron seguidas por el 72,3 % (n=60) y el 82,4 % (n=14) de las personas en los grupos de edad de 18 a 64 y ≥65 años, respectivamente
Conclusión Es necesario construir evidencia en torno a la actividad física en el área rural, a fin de implementar políticas públicas que promuevan su práctica en comunidades que presenten desigualdades socioeconómicas y en salud. Parte de la población de la comunidad donde se llevó a cabo el estudio no sigue las recomendaciones de la OMS para actividad física, en consecuencia, la falta de intervenciones en salud pública se pone en evidencia. Una mayor coherencia entre las resoluciones internacionales, las políticas públicas nacionales y su aplicación podría conducir a un aumento en los niveles de actividad física.

Palabras Clave: Actividad motora, ejercicio, estilo de vida, población rural, promoción de la salud, política pública (*fuente: DeCS, BIREME*).

Physical inactivity is a public health problem regarded as the fourth leading risk factor for mortality in the world (1). Its prevalence trend is increasing, which implies major consequences for health and, in particular, for non-communicable diseases (NCDs), which are the cause of three out of every five deaths per year (2). NCDs large negative impact all over the world has driven policy makers to devise strategies that promote physical activity (3).

The promotion of physical activity is a challenge for both health professionals and policy makers, thus accurate and evidence-based information is required for making decisions on this subject; nevertheless, estimates of physical activity in Colombia are scarce. The first national physical activi-

ty prevalence was calculated in 2005. The overall prevalence was 42.6 %, while differences between urban and rural populations were not observed (24.4 % vs. 29.6 %, respectively) (4). Subsequently, the last studies addressing physical activity, carried out in 2010, show an increase of 3.4 % in the prevalence of physical activity at a national level, but they lack information regarding this aspect in rural population (5). Given this situation, estimations of physical activity disaggregated by relevant categories such as age, sex, urban/rural areas, etc., are a priority for strengthening the evidence-based on this subject and closing the gap between research and policies about it.

The Multidisciplinary Camp for Research and Services (CUMIS, for its Spanish acronym) is a community intervention that aims to increase the level of participation of vulnerable communities in different activities through Community-Based Participatory Research and to provide them with tools and strategies to solve health-related problems (6). Furthermore, CUMIS gathers together students and health care professionals from all over Colombia to carry out health education activities, provide health services and experience first-hand difficulties faced by people living in neglected communities. This initiative is led by the Association of Medical Students' Scientific Societies (ASCEMCOL, for its acronym in Spanish) (7,8).

In Colombia there is a lack of evidence-based information on physical activity in rural populations since studies on this subject have been done mainly in urban scenarios (9-11), which has had repercussions in the development of public policies that effectively counter physical inactivity and unhealthy habits. Therefore, the first step is to identify the different patterns of physical activity and their characteristics. The objectives of this study are to characterize physical activity profiles and to reflect on the need for evidence-based policies in southwestern Colombia. Results obtained here can be used to strengthen the evidence-based on physical activity in the country.

METHODS

A cross-sectional study was performed in the village of Puerto Caldas, Pereira, Risaralda, Colombia, where approximately 7 000 people live. After performing a prioritization process of populations with health issues in Risaralda, this community was selected by the researchers and the Universidad Tecnológica de Pereira (UTP) due to its difficult access to health services. The study was carried out during the second CUMIS, held in April, 2011.

Participants of the study were recruited from individuals that attended the activities of the second CUMIS. The following inclusion criteria were taken into account: participants were of adult age (>18 years) and lived in the targeted community. Furthermore, participants with any kind of physical or mental impairment were excluded from the study. The sample size for one sample proportion (Wald Z test) was calculated by using an alpha of 0.05, a power of 80 %, a null proportion of 50 % and an alternate of 65 % for an expected sample of 80 participants. Prior to the CUMIS, meetings with community leaders were carried out in order to discuss and prioritize health-related problems as potential activities and projects, where the following health issues were identified: NCDs, dengue and malaria. Thus, this study focused on physical activity in the community. Further researches addressing the other topic were also carried out.

In addition, the International Physical Activity Questionnaire (IPAQ) was used to characterize the participants' level of physical activity. The IPAQ has been translated into Spanish and validated in more than twelve countries. It has been used to identify the number of days and hours per week a participant engages in mild, moderate and vigorous physical activity (12).

For this study physical activity was defined as any body movement produced by skeletal muscles resulting in energy expenditure above the basal metabolic rate. It included daily life activities such as household chores, work, as well as activities requiring some degree of effort such as grooming, traveling, house cleaning, car washing and others done by people on a regular basis. On the other hand, exercise was defined as a type of physical activity that has been planned and structured (3,13).

Mild physical activity was defined as activities involving body movement, muscle work and energy expenditure, with a significant increase in heart rate but without causing an outstanding effort to the individual. In turn, moderate physical activity was defined as an activity three to five times more vigorous than the resting state on a relative scale of one to ten. It involved a physical effort that implies an increase in both heart and breathing rate; activities in this category included, , for example, brisk walking, moderate work cleaning and gardening, games and fun activities, as well as cycling at a moderate pace. Finally, vigorous physical activity was defined as an activity that significantly increases both heart and breathing rate and hinders the ability to speak fluently. Vigorous physical activities include: jogging or running, swimming, skating and practicing recreational or competitive sports.

Physical inactivity was defined as the absence of activity or exercise (14). Other variables such as age (18-25, 26-45, 46-59, and >60 years), days (0-2, 3-5, and 6-7 days) and time of physical activity (none, 1-30 minutes, 30 minutes-1 hour, 1-2 hours, 2-4 hours and >4 hours) were categorized.

Descriptions were made by using central tendency and dispersion measures. For category variables, Chi2 or Fisher's exact test were used to compare groups. Likewise, Wilcoxon test was used to compare days and times of physical variables in terms of sex and age. WHO recommendations on physical activity were also analyzed in the 18-64 and >65 years old age groups (at least 150 minutes of moderate-intensity or at least 75 minutes of vigorous-intensity or an equivalent combination of moderate and vigorous intensity aerobic physical activity throughout the week) (1). Data obtained in this study were tabulated in a Microsoft Access® database, while statistical analyses were performed on Stata 13 (College Station, TX: StataCorp LP)® with a 95 % confidence level.

RESULTS

Data from 100 individuals were collected, 62 women and 38 men. Participants' ages ranged between 18 and 90 years, with an average of 43 years (SD±18). Most of the individuals of the sample were between 26 to 45 years old. Other age groups had similar proportions of participants. There were no significant differences between age groups and sex (Table 1).

Table 1. Age distribution according to sex

Age groups (years)	Sex				Total	ρ*
	Female		Male			
	n	%	n	%	%	
18-25	12	19.3	6	15.8	18	0,1
26-45	30	48.4	14	36.8	44	
46-59	13	21.0	7	18.4	20	
≥60	7	11.3	11	29.0	18	
Total	62	100	38	100	100	

*.Fisher exact test

In total, six people did not perform any type of physical activity, while 75 performed mild physical activity at least once per week, with a median of 5 days (p25-75=2-7 days). On the other hand, 79 engaged in moderate physical activity at least once a week, with a median of 3 days (p25-75=2-7 days), while 62 individuals performed any vigorous physical activity at least once a week, with a mean of 4±2 days.

Among those that did any physical activity, 44 % (41) were 26 to 45 years old, 20 % (19) were 46 to 59 years old, 18 % (17) were 18-25 years old, and 18 % were older than 60 years old. There were not significant differences between age groups or those who did or did not any physical activity (Fisher's exact test, p=1).

Times spent by participants on physical activities ranged from 10 minutes to 10 hours of mild physical activity per day, with a median of one hour (p25-75=30 minutes-2 hours); five minutes to 12 hours of moderate physical activity per day, with a median of one hour (p25-75=45 minutes-2 hours), and 10 minutes to 12 hours of vigorous physical activity per day, with a median of three hours (p25-75=2-5 hours). Differences between sex and physical activity are shown in Tables 2 and 3.

Table 2. Distribution by sex of type and length of physical activity in days

Type and duration of physical activity	Sex				p*
	Female		Male		
	n	%	n	%	
Vigorous physical activity (days)					
1-2	10	17.0	4	11.8	0.01
3-5	17	28.8	13	38.2	
6-7	6	10.2	11	32.4	
Moderate physical activity (days)					
1-2	24	38.7	8	21.1	<0.0001
3-5	16	25.8	5	13.2	
6-7	7	11.3	19	50.0	
Mild physical activity (days)					
1-2	19	33.9	7	18.4	0.2
3-5	9	16.1	4	10.5	
6-7	19	33.9	17	44.7	

*.Fisher exact test

There were not significant differences between types of physical activity and participants' age (Wilcoxon test [W], p>0.05). Similarly, the analysis of mild physical activity did not show any significant difference regarding sex (W, p=0.2), although the median time spent by men on mild physical activity b (six days per week) was higher than that found in women (three days per week).

It was observed that men did moderate physical more days per week than women (W, p=0.0001. Men: Median 6, p25-75=2-7 days; Women: Median 2, p25-75=2-3 days). Similar findings regarding vigorous physical activity were obtained (W, p=0.06. Men: Median 5, p25-75=3-6 days; Women: Median 4, p25-75=2-5 days). Men spent more time per day on mild, moderate and vigorous physical activity than women did (W, p=0.04).

Men spent a median of one hour (p25-75=30 minutes-2:50 hours) doing mild physical activity, while the median for women was 30 minutes (p25-p75=20 minutes-1:30 hours). Likewise, men spent more time doing moderate physical activity than women did (W, p=0.03): men had a two hour median (p25-75=1-2 hours), while women, a one hour median (p25-75=30 minutes-2 hours). Finally, regarding the time spent in engaging in vigorous physical activity a significant difference between men and women was observed: men had a four hours per day median, p25-75=2-7 hours), while women, a three hours per day median (p25-75=2-4 hours).

Table 3. Distribution by sex of type and length of physical activity in hours

Type and duration of physical activity	Sex				p*
	Female		Male		
	n	%	n	%	
Vigorous physical activity					
10-30 minutes	2	3.4	1	2.9	
>30 minutes-1 hour	6	10.2	4	11.8	0.05
>1 hour-2 hours	7	11.6	4	11.8	
>2 hours-4 hours	11	18.6	7	20.6	
>4 hours	7	11.9	12	35.3	
Moderate physical activity					
10-30 minutes	14	22.6	3	7.9	
>30 minutes-1 hour	14	22.6	9	23.7	0,1
>1 hour-2 hours	14	22.6	14	36.8	
>2 hours-4 hours	4	6.5	3	7.9	
>4 hours	1	1.6	3	7.9	
Mild physical activity					
10-30 minutes	25	44.6	10	26.3	
>30 minutes-1 hour	10	17.9	10	26.3	0.2
>1 hour-2 hours	5	8.9	1	2.6	
>2 hours-4 hours	6	10.7	4	10.5	
>4 hours	1	1.8	3	7.9	
Any kind of physical activity					
None	4	7.4	2	5.9	
10-30 minutes	9	16.7	2	5.9	
>30 minutes-1 hour	4	7.4	2	5.9	0.2
>1 hour-2 hours	5	9.3	1	2.9	
>2 hours-4 hours	9	16.7	3	8.8	
>4 hours	23	42.6	24	70.6	
No physical activity					
10-30 minutes	19	30.7	6	15.8	
>30 minutes-1 hour	6	9.7	8	21.1	0.04
>1 hour-2 hours	7	11.3	12	31.6	
>2 hours-4 hours	9	14.5	4	10.5	
>4 hours	12	19.4	3	7.9	

*Fisher exact test

Time used for physical inactivity did not have significant differences between males and females (W, p=0.9), as each group showed a median of two hours (p25-75 for men=1-2 hours, p25-75 for women=30 minutes-4 hours). The analysis of time of physical inactivity in terms of categories shows a significant difference regarding sex (Fisher's exact test, p=0.04, see Table 3). Finally, 72.3 % (60) and 82.4 % (14) of the participants in the 18-64 years old and >65 years old age groups, respectively, followed the WHO recommendations on physical activity. In the 18-64 years old age group, women (36, 60 %) were more active than men (24, 40 %) (Chi2, p=0.05). On the contrary, in the >65 years old group, men (10, 71.4 %) were more active than women (4, 28.6 %) (Fisher's exact test, p=0.05).

DISCUSSION

Engaging in physical activity has been related to the prevention of diseases, the improvement of the quality of life, a decrease in the overall incidence of NCDs and to a reduction in complication rates. These healthy habits also have an impact on people's quality of life (15,16). Though healthy policies and strategies aiming to promote physical activities are required to reduce obesity and sedentary lifestyles, such goals are difficult to accomplish in a rural context with low income communities where adopting healthy habits may result in financial hardship for households, and where people rarely participate in public policies programs (16).

Globalization and urbanization trends worldwide have led to changes in lifestyles that contribute to an enhanced risk of NCDs. It is important to acknowledge the different sedentary behaviors of rural communities since they face the largest barriers to access both educational and health services. These communities, currently undergoing a demographic transition, must be targeted by new public health programs designed, from a cross-sectorial approach, so that through their effective participation physical activity is promoted and risk of NCDs is reduced (17).

In Colombia, there are two national measures of physical activity (two versions of the National Survey of Nutritional Status in Colombia, ENSIN for its acronym in Spanish). Besides, there is an international study where it was observed that only half of the Colombian population engages in any type of physical activity (2005, 50.1 %; 2010, 53-5 %), thus it classified Colombia as one of the most physically inactive countries around the world (4,5,18).

It is important to note that the first version of the ENSIN described physical activity profiles in rural populations, but the second did not (4,5). Furthermore, in the second survey it is also reported that Colombia's main cities, Bogotá, Medellín and Cali, have an adjusted prevalence of individuals undertaking physical activity of 57.8 %, 42.3 % and 50.4 %, respectively. When comparing this information with the prevalence for small-rural cities such as Caldas, Risaralda and Quindío (58.5 %), Tolima, Huila and Caquetá (53.2 %), Cauca and Nariño (66.1%), or regions like Amazonía and Orinoquía (52 %) or the Pacific Coast (53.7 %), according to the country distribution of ENSIN, it is possible to observe that these areas have a higher prevalence of physical activity than large cities (5).

In 2010, Vélez et al. (10), in a sample of 460 participants, found that Pereira's prevalence of physical activity was 45.4 %, and that for people of between 18 to 60 years old it was 45.4 % (CI 95 %=40.5 %-49.5 %), which is opposite to what it was seen in the present study, where 6 % of the participants did not engage in any physical activity at all. Also, no significant association between physical activity and sex was found in Vélez's study (10). This finding could be related to the difference between the instruments, population, and definitions that were used in both studies to measure physical activity or inactivity. It is also feasible that the participants of the current study, living in a rural community, had the necessity to perform physical activity as the only way of transportation to their work places and as a way to provide for their families. It is worthwhile to say that participants in our study voluntarily attended to the camp by walking. In the study of Vélez et al., a random sampling was conducted using Pereira's population between 18 and 60 years old, excluding the people older than 60 year, who, in general, are more inactive (10). In Medellin, Martínez et al. (11), using a stratified cluster random sampling method, found a significant difference among sex, with a higher prevalence of physical activity in men (25.8 % vs. 17.3 %, $p<0.0001$), similar to the findings of this study. More studies using different sampling approaches are needed in order to reach a more accurate estimation of data regarding physical activity urban and rural areas in Colombia.

It is important to acknowledge that aspects of rural communities vary greatly both between and within countries. Taking this into account, physical activity should change between nations. In China, 78.1 % and 21.8 % of rural and urban inhabitants, respectively, perform physical activity (19). In Brazil, the prevalence of population in the northeastern and southeastern

regions participating in any physical activity is 0.9 % in rural areas, which is significantly low when compared to urban areas (20). In the United States of America there were no differences between rural and urban areas of the southern part of the country (14,21). Further research comparing physical activity profiles between rural and urban populations in Colombia is needed.

On the other hand, studies carried out in high-income countries show that there is a large proportion of people with overweight and sedentary lifestyles in rural areas (22). Such findings are likely to be related to social, economic, geographic and infrastructure determinants, which are more accentuated in low and middle-income countries. Rural populations with lower socioeconomic status have shown lower levels of physical activity when compared to their urban counterparts (23). This study gives new information on physical activity profiles in rural populations of Colombia.

It is important to mention that physical activity is not only determined by sex and age, but also by other factors such as transportation facilities, positive self-perception of health and occupation, among others (24). For example, an individual's occupation determines the type of physical activity he or she does on a daily basis, the amount of free time available and the perceived need to perform physical activity. Other important factors to consider are those related to the environment, in particular the availability of proper roads or public transportation. These environment-related factors, if properly addressed, may positively influence the performance of routine physical activity. In contrast, if not adequately addressed, they might have a negative impact (25).

Promotion of access to low cost recreation, facilities for cycling and good quality sidewalks, among others, are determinants highly related to the peoples' fulfillment of the WHO Global recommendations on physical activity as seen in a study that involved eleven countries, including Colombia, where an increase between 15 to 50 % of such fulfillment was observed (1,18). However, people showing physical inactivity (6 %) or who don't following the WHO recommendations (18-64 years old=27.71 %, >65 years old=17.65 %), as seen in this study, require further local research in order to understand the reasons behind these situations and potential risks factors they imply so that specific interventions can be developed.

In Pereira, Vélez *et al*. (10) observed a higher prevalence of physical activity among people who were 55 to 60 years old, followed by 18 to 24

and 40 to 44 years old age groups (10). In addition, Gómez *et al.* (9), in a study carried in Bogotá and that included people whose age ranged from 18 to 90 years, found that the 18 to 29 years old age group was the one with the highest level of physical activity (9).

In Medellín, Martínez et al. (9) included participants that were 16 to 85 years old. In this study the highest prevalence was found in the 15 to 19 years old age group, followed by 40 to 49 and 50 to 59 years old age groups. Despite these two studies -Bogotá and Medellín- included a broader spectrum of age groups, no significant difference was found among them (9,11). Even though there were not significant differences between physical activity and age groups in this study, it is important to note that that 20 % of the participants were over 46 years old. Usually, in clinical practice, physical activity is done under prescription by middle aged people and elders since they are prone to cardiovascular and orthopedic consequences. Generally, people over middle age have risk factors for NCDs and a higher incidence of obesity, diabetes, hypertension and osteoporosis, which can make it difficult for these people to engage in physical activity or exercise (17). Nonetheless, the benefits arising from prescribing physical activity to this group of people are considerably higher than the risks it may cause, as long as the physical activity is accompanied by medical supervision and companionship (22).

In the study presented here, 77 % of people in all age groups combined moderate and vigorous physical activities, therefore achieving the times for vigorous activity recommended by the WHO (3). Nevertheless, moderate physical activity times recommended by the WHO were not met by most of the participants, with a median of one hour per week. The combination of both types of physical activities surpasses the 150 minutes per week of physical activity recommendation. Several studies show numerous socio-demographic, psychosocial and environmental conditions that may affect and explain physical activity profiles in different populations (3,25). Despite these findings, the present study experienced limitations that need to be considered. The fact that participants included in the analysis were merely the people who got actively engaged in the Second CUMIS and that the most of them worked in agriculture might represent a selection bias that prevents from establishing the prevalence of physical activity and potential associated factors. Another aspect that may influence findings lies in the fact that this population resides in a rural area where public transportation is rarely available; therefore they need to use alternative ways for transportation such as walking and biking. On the other hand, the unavailability to

collect socio-demographic and biometric data is a limitation of this study that requires to be complemented by future researches.

However, findings obtained in the present study represent an important opportunity to bring about an initial characterization of physical activity, as well as an initial approach to both a neglected population and a neglected topic in public health. These findings provide physical activity profiles and factors like sex, age and other variables that give a better understanding on the situation and ways forward, information that, to our knowledge, has not been previously described.

The current research has produced data that can be used to guide policies aiming to empower people and promote physical activity among low income and low education level populations. It is of vital importance to advocate for a healthy decision making in rural areas, including health promotion and incentives to create healthy social connections and networks among inhabitants (16). Communities can be benefitted from public policies looking to implement programs promoting walking or other kinds of physical activities within the society and targeting environmental determinants of physical activity and its regulations (18). It is necessary to advocate for the formulation, implementation and evaluation of public evidence-based policies promoting physical activity practices in rural communities, which would allow these policies to impact health as a prerequisite for a human-centered development. Periodic measurement of the performing levels of physical activity, focusing on different kinds of populations (i.e. indigenous, rural, displaced, etc.) and considering base-line and follow-up assessments, gives place for the awareness and consciousness required to achieve appropriate public health surveillance and public health action •

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REFERENCES

1. World Health Organization (WHO). Global recommendations on physical activity for health. Geneva: WHO; 2010. 60 p.
2. Barouki R, Gluckman PD, Grandjean P, Hanson M, Heindel JJ. Developmental origins of non-communicable disease: implications for research and public health. Environ Health. 2012;11:42. http://doi.org/brs5.
3. World Health Organization. Global Strategy on Diet, Physical Activity and Health. In: World Health Assembly (WHA) F-SWW, editor. Geneva2004.
4. Instituto Colombiano de Bienestar Familiar (ICBF), Profamilia, Instituto Nacional de Salud, Escuela de Nutrición y Dietetica UdA, Pan American Health Organization (PAHO). [Physical Activity]. In: Villegas CB, editor. [National Survey of Nutritional Status in Colombia] ENSIN 2005. 1st ed. Bogotá D.C.: Instituto Colombiano de Bienestar Familiar (ICBF); 2006. p. 353-77.
5. Fonseca Centeno Z, Heredia Vargas AP, Ocampo Tellez PR, Forero Torres Y, Sarmiento Dueñas OL, Alvarez Uribe MC, *et al.* [Physical Activity]. 2011. In: [National Survey of Nutritional Status in Colombia] ENSIN 2005 [Internet]. Bogota D.C.: Ministerio de la Protección Social, Instituto Colombiano de Bienestar Familiar (ICBF), Instituto Nacional de Salud, Profamilia, Instituto Nacional de Salud, Instituto Colombiano del Deporte, Organización Internacional para las Migraciones, Programa Mundial de Alimentos, Pan American Health Organization (PAHO), Asociación Colombiana de Facultades de Nutrición y Dietetica. 1st. [403-30].
6. Mondragón-Cardona A, Alzate-Carvajal V, Campo-Betancourth CF, Rojas-Mirquez JC, Jiménez-Canizales CE, Martínez JW. [Identification of healthy behaviors: research and services multidisciplinary universitary camping (CUMIS), first experience in Colombia]. Rev Med Risaralda. 2012;18(1):16-21.
7. Mondragón Cardona A, Campo Betancourth CF, Tobón García D, Jiménez Canizalez CE, Alzate Carvajal V, Martínez JW. [Multidisciplinary College Camp for Services and Research (CUMIS) as a strategy for community intervention]. Investig. andina. 2011;13(23):353-62.
8. Bonilla-Escobar FJ, Bonilla-Vélez J, López-Castillo CA. Investigación Médica Estudiantil: Perspectiva desde Colombia. Ciencia e Investigación Medico Estudiantil Latinoamericana. 2010;15(2):94.
9. Gomez LF, Duperly J, Lucumi DI, Gamez R, Venegas AS. [Physical activity levels in adults living in Bogota (Colombia): prevalence and associated factors]. Gac Sanit. 2005;19(3):206-13. http://doi.org/c4q786.
10. Velez Alvarez C, Vidarte Claros JA, Rios Ocampo DM, Muñoz Martinez AP. [Prevalence of physical activity and related factors population aged 18-60 years - Pereira 2010]. Rev Med Risaralda. 2011;17(2):85-90.
11. Martínez EL, Saldarriaga JF, Sepúlveda FE. [Physical Activity in Medellín: a Challenge for Health Promotion]. Rev Fac Nac Salud Pública. 2008;26(2):117-23.
12. Craig CL, Marshall AL, Sjostrom M, Bauman AE, Booth ML, Ainsworth BE, *et al.* International physical activity questionnaire: 12-country reliability and validity. Med Sci Sports Exerc. 2003;35(8):1381-95.
13. World Health Organization, World Health Organization Staff. WHO Handbook for Guideline Development. Geneva: Renouf Publishing Company Limited; 2012.
14. United States Department of Health and Human Services. 2008 Physical activity guidelines for Americans: be active, healthy, and happy! Washington D.C.: Government Printing Office; 2008.
15. World Health Organization (WHO). The World Health Report 2002. Reducing Risk, Promoting Healthy Life. Geneva: WHO; 2002. Available from: https://goo.gl/h8KA6m.

16. Strawbridge WJ, Deleger S, Roberts RE, Kaplan GA. Physical activity reduces the risk of subsequent depression for older adults. Am J Epidemiol. 2002;156(4):328-34. http://doi.org/bfth5h.
17. World Health Organization (WHO), Public Health Agency of Canada. Preventing Chronic Diseases: A Vital Investment. Geneva: WHO; 2005.
18. Sallis JF, Bowles HR, Bauman A, Ainsworth BE, Bull FC, Craig CL, *et al.* Neighborhood environments and physical activity among adults in 11 countries. Am J Prev Med. 2009;36(6):484-90. http://doi.org/cz3ztx.
19. Muntner P, Gu D, Wildman RP, Chen J, Qan W, Whelton PK, *et al.* Prevalence of physical activity among Chinese adults: results from the International Collaborative Study of Cardiovascular Disease in Asia. Am J Public Health. 2005;95(9):1631-6. http://doi.org/dgt5g7.
20. Monteiro CA, Conde WL, Matsudo SM, Matsudo VR, Bonsenor IM, Lotufo PA. A descriptive epidemiology of leisure-time physical activity in Brazil, 1996-1997. Rev Panam Salud Publica. 2003;14(4):246-54. http://doi.org/fxbrq2.
21. Rodjer L, Jonsdottir IH, Rosengren A, Bjorck L, Grimby G, Thelle DS, *et al.* Self-reported leisure time physical activity: a useful assessment tool in everyday health care. BMC Public Health. 2012;12:693. http://doi.org/f2zzd9.
22. Hoffmann K, Bryl W, Marcinkowski JT, Strazynska A, Pupek-Musialik D. Estimation of physical activity and prevalence of excessive body mass in rural and urban Polish adolescents. Ann Agric Environ Med. 2011;18(2):398-403.
23. Parks SE, Housemann RA, Brownson RC. Differential correlates of physical activity in urban and rural adults of various socioeconomic backgrounds in the United States. J Epidemiol Community Health. 2003;57(1):29-35. http://doi.org/dnmx7p.
24. Uribe-Bustos X, Agudelo-Calderón C. [Physical inactivity and risk factors: constructing an explanatory model in Bogota]. Rev. salud pública. 2011;13(4):597-609. http://doi.org/fzss2w.
25. Kruger TM, Swanson M, Davis RE, Wright S, Dollarhide K, Schoenberg NE. Formative research conducted in rural Appalachia to inform a community physical activity intervention. Am J Health Promot. 2012;26(3):143-51. http://doi.org/fz4fhd.