

# SELF-RATED PHYSICAL ACTIVITY LEVEL ACROSS EUROPE – POLAND AND OTHER EUROPEAN COUNTRIES

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**ABSTRACT:** Physical inactivity has become a serious public health problem as it contributes to major non-communicable diseases. Increasing activity levels has beneficial effects on musculoskeletal health and mental health as well. In Poland there are a few studies which refer to the physical activity (PA) of the overall society and which are based on an international questionnaire, thus enabling comparative analysis. The aim of the study was to assess the PA level of the Polish society and to examine fields of their activity and intensity of them in order to compare the data with fifteen European countries. A survey based on computer-assisted personal interview (CAPI) was carried out in Poland in November 2006. A random sample of Polish adults (n=1028) was selected and divided according to demographic criteria. PA was estimated by a short version of the International Physical Activity Questionnaire (IPAQ). In the last seven days 53.4% of the Polish society reported no vigorous PA whereas in the European sample the percentage was significantly higher (57.4%). For the PA of moderate level of intensity 39.8% of the Polish respondents reported no such PA; in the European sample the percentage was 40.8%. Only 12.8% of the Polish respondents reported not having walked in the past week, whereas in the EU the percentage was 17.1%. It must be noted that in all aspects the results were varied in the studied countries. These observations indicate a need for urgent actions to promote HEPA across EU member countries and in particular the least active member states. The present study is the first referring to PA of the whole Polish population, based on a representative sample and an international standardised questionnaire. The data confirm that the PA level of the Polish society is not as low as it has been shown in many studies.

**KEY WORDS:** physical activity level, assessment of physical activity, IPAQ, Polish society

## INTRODUCTION

Physical activity is one of the cornerstones of good health. The human body evolved to be physically active, in a world where the ability to move quickly and walk long distances was essential for survival. In the technologically driven modern age, much activity has been removed from everyday life. Physical inactivity has become a serious public health problem as it is associated with significant risks to many aspects of health. "Unhealthy diets and physical inactivity are among the leading causes of the major non-communicable diseases, including cardiovascular disease, type 2 diabetes and certain types of cancer, and contribute substantially to the global burden of disease, death and disability" [30]. Increasing activity levels has beneficial effects on musculoskeletal health, reducing the risk of osteoporosis, back pain and osteoarthritis [15]. Regular physical activity reduces the risk of depression and has positive benefits for mental health including reduced anxiety, and enhanced mood and self-esteem [18]. Therefore, a physically active lifestyle has been described as public health's best buy [29].

As the importance of physical activity is recognised in health promotion, the task of measuring it becomes a central research and

practice challenge. The assessment of physical activity enables one to estimate indirectly the health status of the population. In order to form positive trends of spending spare time and reveal ways of regeneration and active lifestyle, it is necessary to estimate the physical activity level of the society. Measurement of physical activity is also important to policy makers interested in population surveillance, as well as to practitioners interested in programme evaluation and research.

There are a number of different techniques that have been used to assess physical activity in a variety of populations. Lack of comparability has been a major limitation in studies on physical activity, due to application of different methodological instruments and inconsistent cut-off points. Surveys on sports or recreation participation are generally developed and conducted independently of one another, which can lead to differences in questionnaires, research designs, methodology and definition of terms [28].

In Poland there are a few studies which refer to the physical activity of the overall society and which are based on random and representative samples. Most of them refer only to leisure physical

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activity and omit activity connected with transportation, household, gardening and occupation. Until recently, the only sources of information on the physical activity level of the Polish society were as follows: Charzewski's report "Sport activity of the Poles" (1997); the study of the Central Statistical Office of Poland "Participation of Poles in sports and physical recreation" (1998-1999); reports of the Centre for Public Opinion Research (1997, 2001, 2002); and the WOBASZ programme carried out in cooperation with six centres in Poland (2002-2004).

As far as sport and physical activity are concerned, Poland for the first time participated in the international Eurobarometer studies, conducted from October to November 2004. The survey involved estimation of frequency and places of practising sport and recreation, reasons for inactivity of citizens, advantages and risks (both in individual and social aspects) related to practising sports, and opinions of Europeans about the role of the EU in broadly defined sport policies. However, the Eurobarometer 62.0 does not include any references to duration of activities, on the basis of which it is possible to determine a general level of physical activity. What is more, the lack of defining the notional apparatus leads to different understanding of key terms, such as sport or a sport club.

Comparative studies, which are a key component of social science, were conducted even as early as in the 1950s. At that time, such studies were mainly based on analysing data, collected individually within the scope of various research projects. Systematic comparative studies, which were carried out in more than ten countries, were started in the 1970s. Domański and Ostrowska regard analyses conducted by the European Statistical Office, the World Values Survey (WVS) and the International Social Survey Programme (ISSP) as among the most widely known comparative studies in social sciences. One of the newest projects in this field is the European Social Survey (ESS), which monitors social changes occurring in diverse European populations. The subject area of ESS includes a wide range from the field of social structure, lifestyles and attitudes (i.e. health condition, feeling of security, moral values, etc.) [9]. This report presents the position of Poles among other European nationalities regarding various social issues; however, the interesting topic of physical activity is not included.

In Poland, there is a broad and clearly noticeable deficiency of research on issues related to physical activity of the whole society. There are not many qualitative or quantitative studies on this issue, conducted on a representative sample. Thus, this research project attempts to cover a gap in this field of social studies. As a result of performing the study on Polish society, using a standardised and widely used international tool, it is possible to compare results and reliably evaluate how, in this European, or even world ranking, Polish people present themselves.

The aim of this elaboration is to present results of studies on the level of Poles' physical activity, to examine fields of their activity and intensity of them. These aspects will be discussed in comparison with data from 15 "old" European Union countries.

## MATERIALS AND METHODS

*Subjects.* A random and representative sample of Polish adults (n=1028; 492 men and 536 women) participated in the study. The sampling of the group was carried out using a statistical-mathematical method which involved an adaptive algorithm of selection based on administrative and urbanisational division of the country into regions, voivodeships and types of locations (rural areas, towns up to 20 thousand, 20-200 thousand inhabitants and over 200 thousand inhabitants). The algorithm for interpreting the results employed data derived from the first quarter of 2001, the Polish Labour Force Survey. There were 200 areas selected from the Universal Electronic System for Registration of the Population. In each area there were 5 interviews carried out, the first one with a respondent selected randomly by name and surname, and the other four interviews, in every fifth household, alternating between genders. The counting of households applied the "left-hand method", which determines the surveyor's route by turning left at junctions— while selecting subsequent groups of households. Basic data on the studied subjects are presented in Table 1.

The obtained results were subject to comparative analysis with data derived from Special Eurobarometer 183-6/58.2 referring to

**TABLE I. BASIC CHARACTERISTICS OF SUBJECTS STUDIED**

	Variable	n	%
Sex	Male	492	48.0
	Female	536	52.0
Age	< 19 years	108	10.6
	20 - 29 years	199	19.4
	30 - 39 years	160	15.7
	40 - 49 years	196	19.2
	50 - 59 years	148	14.5
	> 60 years	211	20.6
Education degree	Primary	337	32.9
	Vocational	247	24.1
	Secondary	334	32.7
	Higher	105	10.3
Marital status	Single (never married)	294	28.8
	Married	587	57.4
	Divorced/ Widowed	141	13.8
Place of living	Country	375	36.6
	Town up to 19.999 inhabitants	133	13.0
	Town 20.000 – 49.999 inhabitants	131	12.8
	City 50.000 – 199.999 inhabitants	159	15.5
	City over 200.000 inhabitants	225	22.1

Note: Due to possible data deficiencies, the number of respondents may vary between individual variables.

physical activity of 15 'old' countries of the European Union, before access of Poland and other new member states to the Union. [13]. For this purpose, the data were obtained from the European Commission, Directorate-General Press and Communication – Public Opinion Analysis Unit. The survey covered the population (aged 15 years and over) of the respective nationalities of the European Union member states, applying a multi-stage, random basic sample design. In each EU country, a number of sampling points was drawn with probability proportional to population size (for total coverage of the country) and to population density (table 2). The points were drawn systematically from each of the administrative regional units, after stratification by individual unit and type of area. Hence, they represented the whole territory of member states according to EUROSTAT NUTS 2 (or equivalent) and according to the distribution of the resident population of the respective EU nationalities in terms of metropolitan, urban and rural areas. In each of the selected sampling points, a starting address was drawn at random. Further addresses were selected as every Nth address by standard random route procedures, from the initial address.

#### Measurements

A survey based on computer-assisted personal interview (CAPI) was carried out by 114 interviewers in Poland in November 2006. The interviews were carried out by trained and supervised pollsters, according to all procedures imposed by the IPAQ Scientific Committee. Regarding the European study, the survey was carried out between October and 2002 by the European Opinion Research Group, a consortium of Market and Public Opinion Research agencies, made out of INRA in Belgium – I.C.O. and GfK Worldwide, within wave 58.2 of the standard Eurobarometer. All interviews were face-to-face in the respondent's home and in the appropriate national language.

Physical activity level was estimated by a questionnaire derived from Special Eurobarometer 183-6/58.2 referring to physical activity of 15 'old' countries of the European Union [13]. The questionnaire consisted of two parts: i) the International Physical Activity Questionnaire (IPAQ short version – covers 7 days) ([www.ipaq.ki.se](http://www.ipaq.ki.se)); ii) questions concerning context of physical activity and perception of environmental opportunities for physical activity.

The International Physical Activity Questionnaire (IPAQ) was originally developed in 1998-2000 to provide a self-report measure that can be used to obtain internationally comparable data on habitual physical activity of populations from different countries and sociocultural contexts. The IPAQ has undergone extensive validity and reliability testing in 14 centres from 12 countries across 6 continents [8]. It pertains to several domains: household and gardening work activities, occupational activities, self-powered transport, leisure-time physical activity and sedentary activity as well.

#### Statistical analysis

Data analysis was performed using statistical software SPSS 16.0. Descriptive statistics were used to present the basic data in the study. Inferential statistics were applied in order to discover statistically significant differences between groups. Methods used included the t-test, the  $\chi^2$  test, analysis of variance (ANOVA) and regression analysis.

## RESULTS

*Physical activity level in Poland and in other European countries.* Firstly, the differences between Polish and European samples concerning vigorous and moderate activity undertaken during the last 7 days were assessed. Vigorous physical activities refer to activities that involve hard physical effort and make you breathe much harder

**TABLE 2.** CHARACTERISTICS OF THE EUROPEAN SAMPLE

Country	National institute	Net sample size	Fieldwork period	Population +15 in thous.
Austria	SPECTRA	1023	31/10 - 20/11	6668
Belgium	INFta BELGIUM	1110	4/11 - 28/11	8326
Denmark	GfK DENMARK	1000	6/11-6/12	4338
Finland	MDC MARKETING RESEARCH	1024	6/11 - 8/12	4165
France	CSA-TMO	1037	28/10-29/11	46945
Germany	INRA DEUTSCHLAND	2042	1/11-20/11	68810
Greece	MARKET ANALYSIS	1003	31/10-30/11	8793
Ireland	LANSDOWNE Market Research	1013	3/11 - 29/11	2980
Italy	INRA Demoskopea	1027	6/11 - 30/11	49017
Luxemburg	ILRes	602	28/10-3/12	364
Netherlands	INTOMART	1035	1/11-2/12	12705
Portugal	METRIS	1002	1/11 - 26/11	8217
Spain	INRA ESPAÑA	1000	5/11-28/11	33024
Sweden	GfK SVERIGE	1000	1/11 - 3/12	7183
UK	MARTIN HAMBLIN LTD/ ULSTER MARKETING SURVEYS	1412	28/10-30/11	47310

than normal for at least 10 minutes without pauses, including heavy lifting, digging, aerobics, and fast cycling, whereas moderate activities involve moderate physical effort and make you breathe somewhat harder than normal for at least 10 minutes without pauses, including activities like carrying light loads, cycling at a regular pace, or tennis doubles [8]. In the last seven days, 53.4% of the Polish society reported no vigorous physical activity, whereas the percentage for the average European sample was higher at 57.4%. The  $\chi^2$  test confirmed statistically significant differences between the samples ( $\chi^2=4.43$ ,  $p<0.05$ ). It must be noted that in this aspect the lowest level was reported by the Spaniards (71.9%) and the Italians (63.9%). The highest scores were obtained by the Dutch (43.3%). For physical activity of moderate level of intensity, 39.8% of Polish respondents reported no such physical activity and there was no statistically significant difference in comparison to the general European rate, which was 40.0% ( $\chi^2=0.23$ ,  $p>0.05$ ). It must be noted that in this aspect the results were varied in the studied countries. Only 7.5% of the Dutch reported not to have engaged in moderate physical activity, whereas the percentage was much higher in Spain and France at 51.3% and 52.8% respectively.

Apart from vigorous and moderate activities, walking at work and at home, walking to travel from place to place, and any other walking done solely for recreation, sport, exercise, or leisure was taken into consideration. Only 12.8% of the Polish respondents reported not having walked in the past week. It must be emphasized that only continuous bouts of at least ten minutes at a time of the given kind of physical activities were recorded. Otherwise it would seem astonishing that nearly 13% of Poles did not walk in the last seven days at all. As far as the European sample is concerned, 17.1% of respondents reported not to have walked for at least ten minutes at a time in the past week. In this area the difference was statistically significant ( $\chi^2=12.22$ ,  $p<0.001$ ). The proportion of those who did not walk for at least 10 minutes at a time in the past week was 9.7% in Finland, 11.1% in Denmark, 12.7% in Germany, and 13% in Sweden. A high percentage of respondents did not walk for at least 10 minutes at a time in Belgium (26.7%), the Netherlands (23.3%), and France (22.1%).

Based on the obtained data, the subjects were classified into three categories of physical activity level according to their energetic expenditure: high, moderate and low. High physical activity level – any one of the following 2 criteria: vigorous-intensity activity on at least 3 days and accumulating at least 1500 MET-minutes/week or 7 or more days of any combination of walking, moderate intensity or vigorous intensity activities achieving a minimum of at least 3000 MET-minutes/week. Moderate physical activity level – any one of the following 3 criteria: 3 or more days of vigorous activity of at least 20 minutes per day or 5 or more days of moderate intensity activity or walking of at least 30 minutes per day or 5 or more days of any combination of walking, moderate intensity or vigorous intensity activities achieving a minimum of at least 600 MET-min/week. Low physical activity level – individuals who do not

**TABLE 3.** HIGH PHYSICAL ACTIVITY LEVEL (PAL) WITH 95% CONFIDENCE INTERVAL (CI) AND DIFFERENCES BETWEEN POLAND AND ANALYSED COUNTRIES EXPRESSED AS VALUE OF SIGNIFICANCE LEVEL COEFFICIENT (P)

Country	High PAL % (95% CI)	p
Austria	26.2 (23.4 — 29.1)	p<0.001
Belgium	25.0 (22.9 — 27.7)	p<0.001
Denmark	34.1 (31.1 — 37.1)	ns
EUROPE (15)	31.3 (30.6 — 32.1)	ns
Finland	32.5 (29.6 — 35.4)	ns
France	24.1 (21.5 — 26.7)	p<0.001
Germany	40.2 (37.9 — 42.4)	p<0.001
Greece	37.0 (33.9 — 40.0)	ns
Ireland	29.0 (26.2 — 31.8)	p<0.05
Italy	25.8 (23.0 — 28.6)	p<0.001
Luxemburg	36.3 (32.3 — 40.3)	ns
Netherlands	44.2 (41.1 — 47.3)	p<0.001
Poland	33.5 (31.1 — 35.9)	
Portugal	33.1 (30.1 — 36.2)	ns
Spain	25.2 (22.4 — 28.1)	p<0.001
Sweden	22.9 (20.2 — 25.5)	p<0.001
UK	28.7 (26.3 — 31.2)	p<0.05

Source: Own study and Sjöström M. et al. [26].

Note: ns - not significant

**TABLE 4.** LOW PHYSICAL ACTIVITY LEVEL (PAL) WITH 95% CONFIDENCE INTERVAL (CI) AND DIFFERENCES BETWEEN POLAND AND ANALYSED COUNTRIES EXPRESSED AS VALUE OF SIGNIFICANCE LEVEL COEFFICIENT (P)

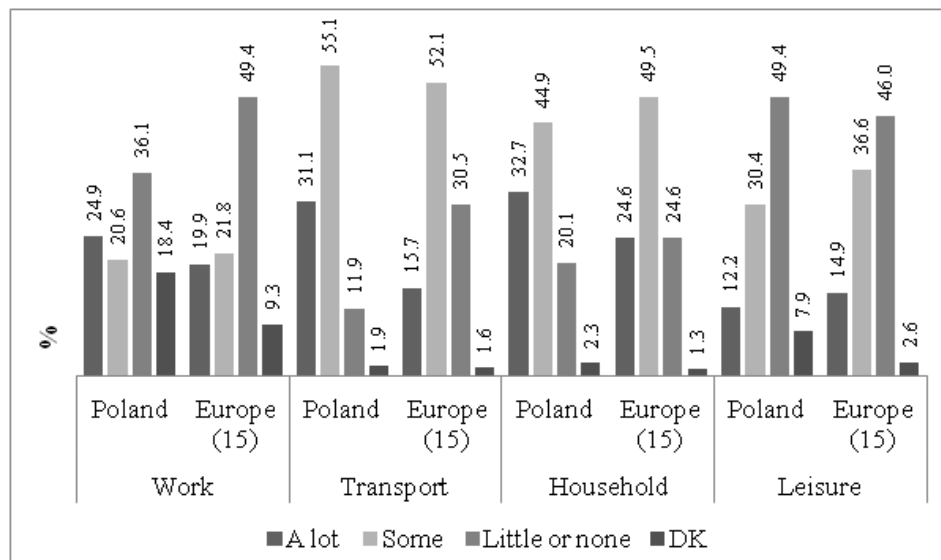
Country	Low PAL % (95% CI)	p
Austria	35.7 (32.6 — 38.8)	p<0.001
Belgium	39.8 (36.8 — 42.8)	p<0.001
Denmark	22.3 (19.7 — 24.9)	p<0.01
EUROPE (15)	31.0 (30.3 — 31.8)	p<0.05
Finland	23.8 (21.2 — 26.5)	p<0.05
France	43.1 (40.1 — 46.2)	p<0.001
Germany	24.1 (22.1 — 26.0)	p<0.05
Greece	32.1 (29.2 — 35.1)	p<0.05
Ireland	34.7 (31.7 — 37.6)	p<0.001
Italy	35.3 (32.7 — 38.4)	p<0.001
Luxemburg	25.8 (22.2 — 29.5)	ns
Netherlands	19.3 (16.8 — 21.7)	p<0.001
Poland	27.9 (25.6 — 30.2)	
Portugal	29.6 (26.6 — 32.6)	ns
Spain	31.2 (28.2 — 34.2)	ns
Sweden	33.1 (30.1 — 36.1)	p<0.05

Source: Own study and Sjöström M. et al. [26].

Note: ns - not significant

meet criteria for categories of high or moderate are considered low/inactive ([www.ipaq.ki.se](http://www.ipaq.ki.se)).

The prevalence of high (Table 3) and low (Table 4) physical activity level is varied across EU member countries. In both cases the confidence coefficient was accepted at the level of 0.95.



**FIG. 1.** AVE COMPARISON OF FIELDS OF PHYSICAL ACTIVITY AND THE INTENSITY LEVEL BETWEEN POLAND AND OTHER EUROPEAN COUNTRIES  
Source: Own study and [13]

#### Particular fields of physical activity

In order to compliment information of the physical activity level, respondents were asked to refer to the context in which they could be physically active, related to their everyday lives, and to specify a grade of being active in each of these fields (Fig. 1). These four fields are: i) work-related physical activity; ii) transportation physical activity; iii) housework, house maintenance, and caring for family and iv) recreation, sport, and leisure-time physical activity.

#### Work-related physical activity

In the activity field related to professional work, it is clear that Poles are more active in this field than average Europeans. In analysed EU countries, it was observed that there are differences in intensity of activity in the field of professional work. The most physically active at work were citizens of Austria (30.2%) and Holland (28.7%). These were the only countries whose citizens reported a higher intensity level than Poles. In contrast to very active ones, the study showed that only 10.6% of Finns, 12.4% of Swedes and 12.9% of Italians stated that they were very active in this area.

#### Transportation physical activity

In the second analysed field of activity, related to moving from one place to another, substantial differences between the Polish sample and European ones were noted. In this field Polish citizens are characterised by a higher intensity level of such physical activity than the inhabitants of 15 EU member states and are also the most active among all member countries in the EU. Citizens of the United Kingdom (26.3%), Portugal (21.6%) and Ireland (20.7%) were ranked shortly after Poles. High results were also noted for Dutchmen (20%) and Germans (19.3%). In the bottom of this ranking, only 4.9% of Finns, 6.9% of Frenchmen and Frenchwomen, and 6.0% of Belgian citizens stated that they were very active in this field.

#### Housework, house maintenance, and caring for family

In the field of physical activity related to housework, a third of Polish respondents reported high activity, whereas the European average was a fourth. The analysis of data from fifteen EU countries showed that about one third of respondents from Germany (37.9%), the United Kingdom (35.2%) and the Netherlands (33.4%) stated that they were very active at home during the week before the survey. Only these countries were characterised by a higher number of people who reported high physical activity related to housework compared to Poles. Only 8.5% of Finns, 10.3% of Frenchmen and Frenchwomen, and 15.2% of Belgian citizens stated that they were very active in this field.

#### Recreation, sport, and leisure-time physical activity

In the last analysed field related to sport and recreation activity of both compared groups of respondents (Poland and Europe), high values regarding a lack of activity are noticeable. A half of Poles reported very low (or no) physical activity and the result from Europe is comparable to it. It is the only field in which the Polish results are lower than the European averages.

Results from particular countries show that the highest activity in this field is reported by citizens of Holland (24.2%), Luxemburg (22.2%), Ireland (19.8%) and Austria (19.3%). Only about 10% of respondents from Southern European countries reported high activity related to sport and recreation (Greece 8.7%; Portugal 9.4%; Italy 9.8%). In the case of Finland, 11.7% of citizens were very active, but on the other hand, as many as 46.7% reported only slight activity.

## DISCUSSION

A reliable evaluation of physical activity of children, teenagers, adults and aged people is a problematic task. For this aim, both objective



and subjective measurement methods are used. Researchers working on the study subject related to determining the physical activity level of a whole society and comparing it with other nations have to confront serious methodological problems. Sources of these problems include use of different terminologies (e.g. inconsistent definitions of used terms, i.e. sport, recreation, physical culture), different research methods (e.g. questionnaire based or physiological indicators based) and various methods of sample selection [28]. Considering surveys on participation in sport and recreation, it is possible to use numerous standardised tools (i.e. IPAQ, COMPASS, HETUS), which can also be an obstacle in a comparative analysis of research results.

In the present research, a short version of the International Physical Activity Questionnaire (IPAQ) was used. It is particularly recommended for evaluating levels of physical activity of whole populations [8]. The IPAQ was designed to measure specifically health-related physical activity primarily for monitoring and surveillance purposes. As the IPAQ is based on new (total physical activity) estimated health-enhancing physical activity recommendations, it attempts to describe not only leisure-time exercise or occupational physical activity but all moderate- and vigorous-intensity activity in multiple domains: leisure time, work, transport and home. What is more, this questionnaire is regarded as one of the most frequently used survey tools for monitoring physical activity level [1,5,21,22].

As the IPAQ provides a comprehensive view on physical activity, it seems to be problematic to compare these results with other reports on physical activity of the Polish society, i.e. studies of Charzewski, the Central Statistical Office or CBOS reports (Public Opinion Research Centre), as they concerned only participation in sport and recreation activities. From those studies, and also from the WOBASZ study [10] and "Bridging the East-West Health Gap" [11], it could be concluded that the level of physical activity among Polish society diverges from international standards.

A comparative analysis with results from fifteen "old" EU countries, regarding high levels of physical activity, revealed no statistically significant differences between Poles and Europeans ( $\chi^2=2.16$ ;  $p>0.05$ ). It must also be emphasised that according to the newest recommendations, the bottom point determining a high level of physical activity, according to the methodology of the IPAQ Scientific Committee, reflects health-enhanced physical activity (HEPA), and thus has a positive influence on health condition [26]. This limit may seem to be quite high; however, experts raised this limit due to the fact that IPAQ enables evaluation of physical activity not only during leisure time but also related to moving from one place to another, at professional work and in housework. Such a dose of physical activity corresponds to about 10 000 steps a day [27]. Considering this assumption, almost two thirds of Poles (60.2%) and Europeans (67%) do not meet these recommendations.

Research results show substantial diversity in levels of total physical activity of citizens of particular countries. The percentage of highly active ranged from 23% in the case of Sweden, 24% for France to 44% of Dutch and 40% of German people. Citizens of Holland,

Germany and Greece are more active than Poles. There were no statistically significant differences between highly active people in Poland and Luxemburg, Denmark and Portugal. Citizens of other countries, i.e. Finland, Ireland, the United Kingdom, Austria, Italy, Spain, Belgium, France and Sweden, were significantly less active than our society. Analysing Poles' position in "the ranking of physical activity", it was noted that Poland is closer to the centre than the bottom of the list, as it is stated in other research.

It is interesting to note that the most active people proved to be citizens of Holland, Denmark and Germany, which are countries characterized by the best infrastructure enabling active transport to work and returning home [26]. It may show a probable relation between environmental factors and levels of physical activity of societies. This issue has been a subject of interest of numerous specialists all around the world. Rütten and Abu-Omar divide these factors into objective and subjective [19]. Objective factors that can favour an active lifestyle include availability [25] and near location of sports infrastructure [14] and safety of a neighbourhood [7,24]. Subjective factors are related to aspects of how a society perceives such issues as satisfaction with [16] and access to infrastructure [4], and attractiveness and security of its immediate neighbourhood [2,6]. At the same time, Sallis found a lack of relations between subjective and objective environmental factors [25]. What is more, Rütten and Abu-Omar point to the need for studying causal relations between environmental factors and the level of physical activity and determining such relations [19]. In such a case, it could turn out that a negative perception of the immediate neighbourhood leads to a sedentary lifestyle or that physically active persons have positive opinions on the surrounding environment.

Profound analyses are necessary for describing relations between environmental factors and levels of physical activity in society. An attempt to determine the relation between perception of the immediate neighbourhood and reported physical activity level could be a subject of further studies and analysis. However, it should be expected that the intensity of this relation is not strong, as the IPAQ includes questions on all physical activities related to everyday lives of respondents: at work, at home, during leisure time and related to moving around. In order to determine the relationship between environmental factors and physical activity, one should exclude fields of physical activity related to house and professional work, as they can weaken the strength of this relation. An appropriate research tool for such a project would be the long version of the International Physical Activity Questionnaire. This version enables a detailed analysis of particular activity fields [8].

Focusing again on the ranking of analysed countries, the results of Eurobarometer 58.2 differ from past studies. One of the first projects using the IPAQ for comparing populations' level of physical activities and which was meant to be conducted on representative samples for particular nations was the European Physical Activity Surveillance System (EUPASS), conducted in eight countries for six months in 2002 [22]. According to the EUPASS results, citizens of

Germany, Belgium, Finland and France proved to lead the most active lives. The least active were people from Italy, the United Kingdom and Spain. Citizens of Holland, who according to Eurobarometer 58.2 were the most active Europeans, were ranked 5 in EUPASS. The most significant difference was in the case of Belgians, who were regarded as one of the least active nations according to Eurobarometer. Also, average energy expenditures of respondents were surprisingly high. It may result from the fact that EUPASS was based on phone interviews (computer-assisted telephone interviewing; CATI). The problem of reevaluation of IPAQ results was a subject of work of the research team of Rzewnicki [23]. They proved that respondents tend to give higher values during phone interviews than in the case of a personal interview. Over 40% of respondents reevaluated the amount of their efforts as intensive (42%), moderate (44%) and in the case of time spent on walking (68%). In total, almost three quarters of respondents gave much higher values regarding their total physical activity during phone interviews. Biernat et al. also point out that performing IPAQ research using other methods than a personal interview, conducted by an experienced surveyor, can lead to reevaluation of results, which they proved by presenting completely different results based on a survey which a respondent should complete and an interview questionnaire which is used by pollsters for asking questions [3]. Such a questionnaire should be completed by a surveyor. It was proved by their research conducted in Masovian Voivodeship in 2005. Statistically significant differences between results of personal interview ( $n=163$ ) and questionnaires completed by respondents ( $n=133$ ) were observed. However, it must be mentioned that these two techniques were not used on the same sample.

Belgians and Spaniards were also regarded as the least active according to the MAREPS project (Methodology for the Analysis of the Rationality and Effectiveness of Prevention and Health Promotion Strategies), which was carried out in the years 1997-1998 in six countries (Belgium, Finland, Germany, Holland, Spain and Switzerland), although not on representative samples. MAREPS analysed health policies of particular countries and health-oriented behaviour, including citizens' physical activity. Finns were ranked first, ahead of Dutchmen and Germans (similarly as in Eurobarometer) [20].

The Institute of European Food Studies from 1997 also show substantial geographical diversity regarding attitudes towards physical activity and levels of physical activity of fifteen European nations [12]. The pan-European survey on consumer attitudes towards physical activity, body weight and health studied mainly levels of citizens' participation in any forms of physical activity. The participation level was very high in the case of Finns (92%) and slightly lower for British (77%) and Germans (70%). The least active were Southern nations: Portuguese (40%), Greek (60%), Italian (62%) and Spanish (63%).

This inveterate stereotype of dividing Europe into active North and sedentary South is visible also in studies of Martinez-Gonzalez et al. regarding physical activity during free time of citizens of 'old'

EU countries [17]. Citizens of Scandinavian countries most often had high values of physical activity (Finland 91.9%; Sweden 90.3%). The lowest results in this ranking are of Southern countries (Portugal 40.7%; Greece 60.4%; Italy 62.3%; Spain 64.0%; France 65.6%). It should be stressed that the survey covered only one of the four physical activity fields which can be analysed using the IPAQ questionnaire. The results of Martinez-Gonzalez et. al. are similar to the information included in the thesis. Portuguese, Italian and Greek citizens were those who reported that they were not too active during recreation [17].

This diversity between particular countries may be explained by the fact that there is no uniform model of organising, managing and financing activity in the field of leisure time. Differentiation of social tasks towards leisure time may be observed.

One should also consider the fact that the IPAQ reveals a comprehensive image of physical activity. It is very probable that respondents who reported a lower level of physical activity related to professional work or housework may be more active in the field of leisure time. At the same time, it will not be consistent with the results of earlier conducted projects because, as mentioned earlier, they mainly related to participation in sport and recreation. This is clearly apparent in the case of Sweden. Almost one fourth of Swedish citizens stated that they were very active in the recreation field and over half of them reported that they did no physical activity during working time. In Poland, the situation is opposite. One fourth of Poles reported doing physical activity in their professional work, but in the case of recreation this value was only 12.2%.

Unfortunately, there are no adequate studies resolving the dispute on the optimal dose of physical activity in each of the four activity fields. What is more, Rütten et al. note that the amount of calories spent during physical activity at work and during leisure time can have significantly different effects on health [22]. This is why profound analyses are necessary. Authors of other works perceive more methodological problems related to the IPAQ questionnaire and its use for monitoring physical activity in European countries [21]. They consider this tool's reliability and accuracy as still too low. Additionally, comparing research results with earlier used indicators can be problematic as well. For example, Finland has a well-developed system of analysing physical activity, which has been used successively since the 1970s [21]. Finnish specialists are not eager to accept new tools as they do not want to lose data that they collected for such a long period, and, due to methodological differences, the IPAQ does not offer them reference to earlier results. In their national system, they developed an indicator for forecasting a subjective evaluation of state of health which is much stronger than in the case of the IPAQ. A similar difficulty was observed when IPAQ results were compared with national systems in Belgium, Holland and Germany. When there were any questions on the same aspect, e.g. amount of sedentary time, the results of correlations between variables were very low (0.3-0.4) [21,22].

In Poland, there is no such dilemma, as we did not participate in international systems of monitoring physical activity levels. There are no research results that could show long-term prognoses in relation to other nations. The project "Bridging the East-West Health Gap" (implemented within the scope of the programme CINDI WHO) is one of only a few projects presenting the situation in Poland compared to other countries (Finland, Spain, Germany, Hungary, Russia) [11]. Results of research conducted in the years 1996-1999 also showed substantial diversity of physical activity levels (recreational and non-recreational) in analysed countries. We can observe the creation of a division into Western European countries, with a high percentage of respondents who report high (27.3%) or moderate (31.6%) physical activity, and East-Central European countries, characterised by a high percentage of people reporting a sedentary lifestyle. Poland was last in this classification. As many as 70% of Polish respondents stated that they do not practise any physical exercises. It is worth mentioning that about 11% of Polish participants of that study (citizens of Łódź) regarded physical work, which replaces sport and recreation activity, as a reason for their lack of exercise.

## CONCLUSIONS

The above discussed project is the first large nationwide study in Poland, conducted on a representative, stratified and random sam-

ple, which used an international standardised questionnaire (IPAQ). As it adopted the same methodology as the European study, it enabled a comparative analysis with results from 15 EU member countries.

We can identify the following major findings of the study:

1. The physical activity level of Polish society, evaluated at the beginning of the 21st century, is higher in comparison to results from the 1990s projects.
2. There are no statistically significant differences in health-enhanced physical activity level between Poles and Europeans. Two thirds of the adult populations are insufficiently physically active for optimal health benefits.
3. There is substantial diversity across countries, with around three fourths of the populations being insufficiently active in several countries.
4. Polish society self-reports a higher intensity level in work-related, transportation and household activity than average Europeans. However, Polish citizens report lower recreational physical activity than Western Europeans.

These observations indicate a need to increase Poles' awareness regarding benefits of physical activity during leisure time and for intensive continuation of projects which promote healthy lifestyles.

## REFERENCES

1. Abu-Omar K., Rütten A., Robine J.M. Self-rated health and physical activity in the European Union. *Soz. Praventivmed.* 2004;49:235-242.
2. Ball K., Bauman A., Leslie E., Owen N. Perceived environmental aesthetics and convenience and company are associated with walking for exercise among Australian adults. *Prev. Med.* 2001;33:434-440.
3. Biernat E., Stupnicki R., Lebedziński B., Janczewska L. Assessment of physical activity by applying IPAQ questionnaire. *Phys. Educ. Sport.* 2008;52:46-52.
4. Booth M.L., Owen N., Bauman A., Clavisi O., Leslie E. Social-cognitive and perceived environment influences associated with physical activity in older Australians. *Prev. Med.* 2000;31:15-22.
5. Brown W.J., Trost S.G., Bauman A., Mummery K., Owen N. Test-retest reliability of four physical activity measures used in population surveys. *J. Sci. Med. Sport* 2004;7:205-215.
6. Carnegie M.A., Bauman A., Marshall A.L., Mohsin M., Westley-Wise V., Booth M.L. Perceptions of the physical environment, stage of change for physical activity, and walking among Australian adults. *Res. Q. Exerc. Sport* 2002;73:146-155.
7. Craig C.L., Brownson R.C., Cragg S.E., Dunn A.L. Exploring the effect of the environment on physical activity: a study examining walking to work. *Am. J. Prev. Med.* 2002;23:36-43.
8. Craig C.L., Marshall A.L., Sjostrom M., Bauman A.E., Booth M.L., Ainsworth B.E., Pratt M., Ekelund U., Yngve A., Sallis J.F., Oja P. International physical activity questionnaire: 12-country reliability and validity. *Med. Sci. Sports Exerc.* 2003;35:1381-1395.
9. Domański H., Ostrowska A., Sztabiński P.B. (eds.) *W środku Europy? Wyniki Europejskiego Sondażu Społecznego /In the middle of Europe? Results of the European Social Survey/*. IFiS PAN, Warszawa 2006.
10. Drygas W., Kwaśniewska M., Szcześniewska D., Kozakiewicz K., Głuszek J., Wiercińska E., Wyrzykowski B., Kuriata P. Ocena poziomu aktywności fizycznej dorosłej populacji Polski. Wyniki programu WOBASZ /Assessment of physical activity level of adult Polish population. Results of WOBASZ programme/. *Kardiologia Polska.* 2005;63(supl.4) (in Polish)
11. Drygas W., Skiba A., Bielecki W., Puska P. Ocena aktywności fizycznej mieszkańców sześciu krajów europejskich. Projekt „Bridging East – West Health Gap” /Assessment of physical activity of inhabitants of six European countries. Project „Bridging East – West Health Gap”/. *Med. Sportiva* 2001;5:119-28.
12. European Commission. A Pan EU Survey on consumer attitudes to physical activity, body weight and health. IFES, Luxembourg 1999.
13. European Commission. Special Eurobarometer 183-6/58.2. *Phys. Activity* 2003.
14. Giles-Corti B., Donovan R.J. The relative influence of individual, social and physical environment determinants of physical activity. *Soc. Sci. Med.* 2002;54:1793-1812.
15. Hootman J. Physical activity, fitness, and joint and bone health. In: C. Bouchard, S.N. Blair, W.L. Haskell (eds.) *Physical Activity and Health. Human Kinetics, Champaign* 2007;pp. 219-230.
16. MacDougall C., Cooke R., Owen N., Willson K., Bauman A. Relating physical activity to health status, social connections and community facilities. *Aust. N. Z. J. Public Health* 1997;21:631-637.
17. Martinez-Gonzalez M.A., Varo J.J., Santos J.L., De Irala J., Gibney M., Kearney J., Martinez J.A. Prevalence of physical activity during leisure time in the European Union. *Med. Sci. Sports Exerc.* 2001;33:1142-1146.
18. Raglin J.S., Wilson G.S., Galper D. Exercise and Its Effects on Mental Health. In: C. Bouchard, S.N. Blair, W.L. Haskell (eds.) *Physical Activity and Health. Human Kinetics, Champaign* 2007;pp. 247-258.
19. Rütten A., Abu-Omar K. Perceptions of environmental opportunities for physical



- activity in the European Union. *Soz. Praventivmed.* 2004;49:310-317.
20. Rütten A., Luschen G., Von Lengerke T., Abel T., Kannas L., Rodriguez Diaz J.A. Health promotion policy in Europe: rationality, impact, and evaluation. Oldenbourg, München 2000.
  21. Rütten A., Vuillemin A., Ooijendijk W.T., Schena F., Sjoström M., Stahl T., Vanden Auweele Y., Welshman J., Ziemainz H. Physical activity monitoring in Europe. The European Physical Activity Surveillance System (EUPASS) approach and indicator testing. *Public Health Nutr.* 2003;6:377-384.
  22. Rütten A., Ziemainz H., Schena F., Stahl T., Stiggelbout M., Auweele Y.V., Vuillemin A., Welshman J. Using different physical activity measurements in eight European countries. Results of the European Physical Activity Surveillance System (EUPASS) time series survey. *Public Health Nutr.* 2003;6:371-376.
  23. Rzewnicki R., Vanden Auweele Y., De Bourdeaudhuij I. Addressing overreporting on the International Physical Activity Questionnaire (IPAQ) telephone survey with a population sample. *Public Health Nutr.* 2003;6:299-305.
  24. Sallis J.F., Bowles H.R., Bauman A., Ainsworth B.E., Bull F.C., Craig C.L., Sjoström M., De Bourdeaudhuij I., Lefevre J., Matsudo V., Matsudo S., Macfarlane D.J., Gomez L.F., Inoue S., Murase N., Volbekiene V., McLean G., Carr H., Heggebo L.K., Tomten H., Bergman P. Neighborhood environments and physical activity among adults in 11 countries. *Am. J. Prev. Med.* 2009;36:484-490.
  25. Sallis J.F., Hovell M.F., Hofstetter C.R., Elder J.P., Hackley M., Caspersen C.J., Powell K.E. Distance between homes and exercise facilities related to frequency of exercise among San Diego residents. *Public Health Rep.* 1990;105:179-185.
  26. Sjöström M., Oja P., Hagströmer M., Smith B.J., Bauman A. Health-enhancing physical activity across European Union countries: the Eurobarometer study. *J. Public Health* 2006;14:291-300.
  27. Tudor-Locke C., Bassett D.R., Jr. How many steps/day are enough? Preliminary pedometer indices for public health. *Sports Med.* 2004;34:1-8.
  28. van Bottenburg M., Rijnen B., van Sterkenburg J. Sports participation in the European Union. Trends and differences. Nieuwegein/'s-Hertogenbosch: Arko Sports Media/W.J.H. Mulier Institute 2005.
  29. van Mechelen W. A physically active lifestyle-public health's best buy? *Br. J. Sports Med.* 1997;31:264-265.
  30. WHO. Global Strategy on Diet, Physical Activity and Health. 2004. (Retrieved June 24, 2011 from [http://www.who.int/dietphysicalactivity/strategy/eb11344/strategy\\_english\\_web.pdf](http://www.who.int/dietphysicalactivity/strategy/eb11344/strategy_english_web.pdf)).