

THE IMPACT OF INCOME, EDUCATION AND HEALTH ON LIFESTYLE IN A LARGE URBAN POPULATION OF POLAND (CINDI PROGRAMME)

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Abstract.

Objectives: The objective of our study was to examine the impact of income, education chronic diseases and self-rated health on health behavior (smoking, alcohol consumption, physical activity, diet) in a large urban population of Poland. **Materials and Methods:** The data were collected in Łódź, a large industrial city of Poland, between 2001 and 2002, as a part of the Countrywide Integrated Noncommunicable Diseases Intervention Programme. The surveys were directed at random samples of the adult population (1837 men and women, aged 18–64 years). A questionnaire completed during a doctor's visit was used for data collection. **Results:** Smoking was more prevalent in men than in women, and its prevalence was lower among the better-educated people. The older men drank the most. Strong alcohol consumption was more prevalent in women with a higher education and the highest income. The presence of any of the studied chronic illness decreased daily smoking and the frequency of alcohol consumption among men. Use of vegetable oil in food preparation was less prevalent among older men. Married men in the "medium" education group and widows used vegetable oil most frequently. Healthy physical activity was most prevalent among men in the higher income group; lower rates were observed among persons with skilled education and in men with chronic illnesses. **Conclusions:** Based on our findings, we may conclude that education has a strong impact on our lifestyles. It is also evidenced that people who suffer from chronic illness show stronger motivation for healthy behavior. However, we found no relationship between health status and food habits.

Key words:

Education, Income, Health, Lifestyle, CINDI

INTRODUCTION

Mortality and morbidity rates are much more favorable in West Europe than in the countries of Central and Eastern Europe [1,2]. From 1989, Eastern Europe has witnessed an increase in both poverty and inequality. Health behavior (e.g., smoking, alcohol consumption, diet, physical activity) and socioeconomic status have been suggested to be important contributors to the East-West differences [3]. Many arguments that speak for health behaviors are relat-

ed to economic factors, the contribution of which still remains unclear with respect to both the magnitude and the mechanisms through which they operate [4]. One of the strongest and most consistent predictors of a person's morbidity experience is his or her socioeconomic status (SES) [5,6], which is represented by a combination of financial, occupational, and educational factors [7]. Although these dimensions of SES are interrelated, income seems to be a very important factor, which reflects purchasing power,

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housing, diet, and medical care [8]. Education indicates the requirement for acquiring positive social, psychological, and economic position [7].

Through the Countrywide Integrated Noncommunicable Diseases Intervention (CINDI) Programme [9] some countries have collaborated to develop productive initiatives for health promotion and disease prevention. Initiatives such as the CINDI Health Monitor survey, based on the Finbalt (Finland Baltic) survey methodology [10], or the joint WHO/EU EUROHIS project on common methods and instruments for health interview surveys, have contributed to setting standards and protocols for the collection of data on risk factors and health behavior.

Until now, limited data on changes in the socioeconomic system and their impact on the health behavior have been available in Poland, where unemployment is one of the consequences of the ongoing transformations of the political and economic systems [11]. Recent national initiatives for health promotion and disease prevention in Poland have influenced the lifestyle of people and their approach to health issues, e.g. prevention of chronic diseases. The year 2001 witnessed the strengthening of the position of the CINDI Poland Programme as one of the most important and productive national initiatives for health promotion and disease prevention [9]. This study is a part of the CINDI Programme designed to decrease morbidity and mortality due to noncommunicable diseases by focusing on lifestyle changes and preventive interventions [9]. The first randomized surveys under the CINDI Programme were performed in Łódź in 1990/91 [12] and then repeated in 1995/1996 [13]. This is the third study under the CINDI Programme conducted during the transformation of economically underdeveloped societies to urbanized, industrialized, and modernized societies.

The aim of the present study was to examine the impact of income, education, health status (the presence of chronic diseases, e.g., hypertension, hypercholesterolemia, gastritis, coronary heart disease, diabetes) and self-rated health on lifestyle (smoking, alcohol consumption, physical activity, diet) in the population of Łódź, a large industrial city

in the central part of Poland, during the process of economic, political, and social transition that have affected people's lives.

MATERIALS AND METHODS

Data collection

The data were collected as a part of the CINDI Programme for the World Health Organization Regional Office for Europe. The study was conducted from September 2001 to January 2002. Methods were standardized according to the WHO guidance for CINDI Programme [9]. The CINDI Health Monitor surveys are based on the common core questionnaire [9]. The participating area for this project was Łódź. The surveys were directed at random samples of the adult population based on health insurance registration. Invitations were sent to 2000 men and women (aged 18–64 years) to visit the Medical Academy (now Medical University). The data were collected by means of a questionnaire administered at interviews, followed by a doctor's visit. Repeated invitations were mailed to non-respondents. Non-respondents were not replaced by other individuals. Questionnaire data were coded and entered into the same file with the sample data. The questionnaire included the following groups of information:

- personal data, family status, education, income
- data on self-reported lifestyle:
 - smoking history
 - alcohol consumption
 - use of vegetable oil
 - physical activity
- medical history on chronic diseases of the participant, diagnosed by a specialist in the last 12 months prior to the survey.

Diagnosis of chronic diseases was confirmed by medical examination and basic laboratory tests (blood pressure, total and LDL cholesterol and sugar blood level) performed in all respondents.

Study area

Łódź situated in the central part of Poland is its second largest city. At the end of 2001, Łódź had a population of

785 000 [14]. The unemployment rate decreased in 2002 (18.5%), but is still above the country average (17.4%). The mean income in Łódź is also lower than in the rest of the country. The proportion of inhabitants who have not completed any school is lower (4.6%) than the country average (6.3%) [11].

Study variables

Family status included: single, married, divorced, and widowed persons.

Education was divided into four categories: primary, skilled, high, and college/university.

Income (information) was defined as gross monthly household income per person and divided into five categories ranging from less than € 75 to € 375 or more (€ 1 = UK £ 0.7, or US \$ 1.12). Categorization of income was done according to existing natural categories in Poland.

Smoking. Respondents were asked 1) whether they had smoked cigarettes during their entire life, and 2) whether they currently smoke. Individuals who responded positively to questions 1) and 2) or 2) alone were defined as “daily smokers”. Those who responded positively to question 1) but negatively to question 2), and those who responded negatively to question 1) were defined as “others”.

Frequency of strong alcohol consumption was assessed by asking the following question: “How often do you usually take strong spirits?” with seven possible answers: 1) never; 2) a few times a year; 3) once a month; 4) 2–3 times a month; 5) once a week; 6) 2–3 times a week; 7) daily. It was dichotomized as follows: (i) frequent consumption (men – once per week or more, women – 2–3 times per month or more) and (ii) others.

Vegetable oil used in food preparation was assessed by asking the following question: “What kind of fat do you mostly use for food preparation at home? (please circle only one alternative)” 1) vegetable oil; 2) margarine; 3) butter or product with mainly butter; 4) lard or other animal fat; or 5) no fat at all. The variable was dichotomized as follows: (i) vegetable oil and (ii) others.

Frequency of leisure-time physical exercise was assessed by asking the following question: “How often do you do physical exercise at leisure lasting at least 30 min making you at least mildly short of breath or perspire?” 1) daily; 2) 4–6 times a week; 3) 2–3 times a week; 4) once a week; 5) 2–3 times a month; 6) a few times a year or less; or 7) I cannot exercise because of an illness or disability. It was categorized as follows: (i) frequent physical activities (2–3 times a week or more) or (ii) others.

Medical history on chronic diseases included chronic diseases diagnosed by specialist at least 12 months prior to the questionnaire interview. It was categorized as follows: (i) chronic disease (the presence of at least one of the following diseases: hypertension, hypercholesterolemia, gastritis, coronary heart disease or diabetes) or (ii) others.

Subjective outcomes of health were measured as follows. The respondents were asked to rate their own health by answering the question: “How would you assess your present state of health?”. The answers “poor”, and “good” were provided.

All definitions, methods of calculating, methods and circumstances of measurements as well as precision of each feature registration were used according to the recommendations of the CINDI WHO Programme [9].

Dichotomization and categorization of all dependent variables were based on the Finbalt Health Monitor Survey [15].

Statistical analysis

Patterns of health behaviors were compared by fitting logistic regression models to dichotomous variables [16,17]. All the models were fitted separately to males and females. The overall effect was added first, then the effect of age, marital status, education, income, health status, and finally the effect of self-rated health. The first category of each factor was the reference category.

$P < 0.05$ was considered to reflect statistical significance. The results of the adjusted main effect models are presented in odds ratios (OR) and 95% confidence intervals (CI) (Tables 2–5). All statistical analyses were performed using SPSS for Windows release 11.5 software.

RESULTS

Population characteristics

The questionnaire was completed by 1837 respondents. Distribution of the study population by age, socioeconomic status, smoking and alcohol consumption, frequency of physical exercise, vegetable oil used and chronic illnesses is shown in Table 1.

Nearly 45% of participants reported income corresponding with the country average (€ 125–249 per month/person). In every seventh household, the income was lower than € 75 per month/person. Among men smoking and alcohol consumption were more prevalent than among women. A lower prevalence of physical activities in women than in men was observed. More women than men used vegetable oil. Among chronic diseases, hypertension was most frequently reported (20.7%). This was followed by hypercholesterolemia (13.6%), gastritis (9.3%), coronary heart disease (7.8%), and diabetes (3.3%). In the group of diabetic patients, 97% of them contracted type 2 diabetes mellitus.

Effect of age, marital status, education, income, health status and self-rated health on daily smoking

Smoking was more prevalent in married men ($p = 0.02$), divorced men ($p = 0.01$) and divorced women ($p = 0.02$). The prevalence was lower among the better-educated men ($p < 0.0001$) and women ($p < 0.0001$). The gradient is clearly visible. The presence of any of the studied chronic illness decreased the prevalence of daily smoking among men ($p = 0.02$). There was no association between daily smoking and self-rated health (Table 2).

Effect of age, marital status, education, income, health status and self-rated health on frequent strong alcohol consumption

The older men drank the most ($p = 0.01$). The presence of any of the studied chronic illness decreased the prevalence of frequent strong alcohol consumption among men ($p = 0.04$). In women with higher education and the highest income, high consumption was more prevalent ($p = 0.03$ and $p = 0.04$, respectively). There was no association between strong alcohol consumption and self-rated health, (Table 3).

Table 1. Characteristics of respondents

Variables	Men N = 1001 (%)	Women N = 836 (%)	All respondents N = 1837 (%)
Age (years) mean \pm SD	41.1 \pm 13.8	39.9 \pm 13.8	40.6 \pm 13.8
Marital status:			
single	27.3	24.3	25.9
married	65.0	59.7	62.6
divorced	6.3	8.9	7.5
widowed	1.4	7.1	4.0
Education:			
primary	13.6	11.4	12.6
skilled	29.4	17.5	24.0
high school	43.1	53.9	48.0
college/university	14.0	17.2	15.5
Income (€):*			
<75	13.5	13.6	13.6
75–124	24.9	29.5	27.0
125–249	46.8	44.7	45.8
250–374	7.7	7.8	7.7
>374	7.2	4.3	5.9
Smoking:			
daily smokers	38.0	22.5	30.9
others	62.0	77.5	69.1
Frequency of strong alcohol consumption:			
frequent consumers**	6.7	3.6	5.3
others	93.3	96.4	94.7
Kind of fat used:			
vegetable oil	80.7	85.3	82.8
others	19.3	14.7	17.2
Frequency of leisure-time physical exercise:			
frequent ***	29.2	21.9	25.9
others	70.8	78.1	74.1
Chronic diseases:			
hypertension			
absence	79.0	79.5	79.3
presence	21.0	20.5	20.7
hypercholesterolemia			
absence	87.7	84.9	86.4
presence	12.3	15.1	13.6
gastritis			
absence	91.3	90.0	90.7
presence	8.7	10.0	9.3
coronary heart disease			
absence	91.8	92.7	92.2
presence	8.2	7.3	7.8
diabetes			
absence	96.7	96.8	96.7
presence	3.3	3.2	3.3
Self-rated health:			
good	70.3	70.2	70.3
poor	29.7	29.8	29.7

* Gross income per month/person/per household in €.

** Men – once per week or more, women – 2–3 times per month or more.

*** 2–3 times a week or more.

Table 2. Daily smoking by background variables, OR* and 95%CI

Variables	Men			Women		
	OR	-95%CI	+95%CI	OR	-95%CI	+95%CI
Age (continuum)	0.99	0.98	1.01	1.0	0.98	1.02
Marital status:						
single	1			1		
married	1.65	1.08	2.50	0.90	0.54	1.48
divorced	2.30	1.20	4.45	2.20	1.10	4.40
widowed	2.35	0.72	7.69	0.87	0.36	2.10
Education:						
primary	1			1		
skilled	0.61	0.39	0.93	0.71	0.40	1.25
high school	0.51	0.34	0.77	0.37	0.22	0.62
college/university	0.25	0.14	0.44	0.18	0.09	0.39
Income (€):**						
<75	1			1		
75–124	0.64	0.44	1.09	1.12	0.65	1.91
125–249	0.54	0.35	1.08	1.12	0.66	1.87
250–374	0.63	0.34	1.17	1.39	0.62	3.12
>374	0.57	0.29	1.13	1.08	0.35	3.31
Chronic illnesses:						
absence	1			1		
presence	0.68	0.49	0.94	0.72	0.46	1.1
Self-rated health:						
good	1			1		
poor	1.32	0.94	1.85	0.86	0.57	1.31

* Adjusted for all other terms of the model.

** Gross income per month/per person/per household in €.

Table 3. Frequency of strong alcohol consumption* by background variables, OR** and 95%CI

Variables	Men			Women		
	OR	-95%CI	+95%CI	OR	-95%CI	+95%CI
Age (continuum)	1.04	1.01	1.07	0.99	0.95	1.03
Marital status:						
single	1			1		
married	0.45	0.20	1.01	1.05	0.39	2.85
divorced	1.22	0.44	3.41	1.77	0.38	8.25
widowed	0.86	0.15	4.88	2.75	0.36	21.26
Education:						
primary	1			1		
skilled	0.63	0.29	1.35	2.13	0.33	21.03
high school	0.57	0.27	1.20	2.41	1.11	19.55
college/university	0.86	0.35	2.11	3.99	1.25	35.13
Income (€):**						
<75	1			1		
75–124	1.09	0.41	2.95	1.52	0.17	14.00
125–249	1.36	0.56	3.30	3.27	0.42	25.64
250–374	2.05	0.67	6.30	5.29	0.59	47.89
>374	1.86	0.55	6.23	7.13	1.01	68.20
Chronic illnesses:						
absence	1			1		
presence	0.73	0.39	0.98	0.59	0.19	1.84
Self-rated health:						
good	1			1		
poor	0.86	0.45	1.36	0.41	0.11	1.51

* Men – ≥1 per week, women – 2–3 times a month or more.

** Adjusted for all other terms of the model.

*** Gross income per month/per person/per household in €.

Effect of age, marital status, education, income, health status and self-rated health on the use of vegetable oil in cooking

Use of vegetable oil in food preparation was less prevalent among older men ($p = 0.04$). Married men ($p = 0.009$) and widows ($p = 0.03$) used vegetable oil more frequently. There was no association between the use of vegetable oil in food preparation and self-rated health (Table 4).

Effect of age, marital status, education, income, health status and self-rated health on frequent leisure-time physical activity

The highest prevalence of taking regular physical exercise was among men in the higher income group ($p = 0.02$); the gradient is clearly visible. Lower prevalence of physical exercise was observed in the skilled ($p = 0.04$) and chronically ill males ($p = 0.005$). The lowest prevalence of physical activity was found in the group of widows ($p = 0.006$).

There was no association between physical exercise and self-rated health (Table 5).

A significant association between chronic illness and poor self-rated health was found (data not shown). These variables were included into one model. Due to multicollinearity of independent variables odds ratios could be distorted.

DISCUSSION

The purpose of this study was to examine the effect of income, education, and health on health behaviour, (smoking, alcohol consumption, vegetable oil consumption, and physical activity) in the adult population of Łódź, during the process of economic, political, and social transition that have affected people's lives.

It is hugely encouraging that more than two million Polish people quit smoking in the 1990s, despite desperate efforts of the tobacco industry to attract new smokers. More

Table 4. The use of vegetable oil in food preparation by background variables, OR* and 95%CI

Variables	Men			Women		
	OR	-95%CI	+95%CI	OR	-95%CI	+95%CI
Age (continuum)	0.98	0.97	0.99	1.01	0.99	1.03
Marital status:						
single	1			1		
married	1.95	1.18	3.21	1.40	0.81	2.40
divorced	1.39	0.65	3.03	1.46	0.62	3.45
widowed	1.81	0.44	7.45	5.55	1.15	26.78
Education:						
primary	1			1		
skilled	1.55	0.95	2.54	1.02	0.48	2.18
high school	1.60	0.99	2.58	1.18	0.60	2.34
college/university	1.53	0.80	2.91	1.19	0.52	2.75
Income (€):*						
<75	1			1		
75-124	0.63	0.36	1.10	1.06	0.58	1.93
125-249	0.84	0.50	1.45	1.40	0.77	2.56
250-374	0.95	0.43	2.09	0.79	0.34	1.85
>374	1.45	0.58	3.66	2.09	0.54	8.08
Chronic illnesses:						
absence	1			1		
presence	1.88	0.95	2.84	1.13	0.68	1.89
Self-rated health:						
good	1			1		
poor	0.63	0.42	1.01	0.62	0.38	1.01

* Adjusted for all other terms of the model.

** Gross income per month/per person/per household in €.

Table 5. Frequency of leisure-time physical exercise* by background variables, OR**and 95%CI

Variables	Men			Women		
	OR	-95%CI	+95%CI	OR	-95%CI	+95%CI
Age (continuum)	0.99	0.97	1.01	1.00	0.93	1.02
Marital status:						
single	1			1		
married	0.75	0.49	1.15	0.42	0.27	0.68
divorced	0.54	0.25	1.16	0.34	0.16	0.74
widowed	0.57	0.14	2.30	0.25	0.09	0.67
Education:						
primary	1			1		
skilled	0.59	0.37	0.97	1.29	0.62	2.69
high school	0.99	0.64	1.58	1.58	0.82	3.02
collage/university	0.61	0.34	1.09	1.66	0.77	3.55
Income (€):***						
<75	1			1		
75-124	1.72	1.00	2.94	1.25	0.71	2.19
125-249	1.98	1.20	3.29	1.00	0.58	1.74
250-374	2.19	1.10	4.39	1.38	0.64	2.97
>374	2.33	1.13	4.78	1.1	0.42	2.86
Chronic illnesses:						
absence	1			1		
presence	0.59	0.41	0.85	1.27	0.83	1.96
Self-rated health:						
good	1			1		
poor	1.02	0.69	1.48	0.74	0.48	1.14

* 2-3 times a week or more.

** Adjusted for all other terms of the model.

*** Gross income per month/per person/per household in €.

than 69% of the respondents reported that they had never smoked. Smokers were mostly men, and divorced persons. There was relation between smoking and education; in the present study smoking was actually more common among lower-educated people. This is in agreement with the results reported by other authors [15,18]. Education promotes a non-smoking lifestyle – generally speaking a healthy western lifestyle.

The common feature at a very general level appears to be low alcohol consumption among women and older people [19]. In our population, the older men drank the most. This is in agreement with the Finbalt study: in Finland the oldest men drink the most; in Estonia and Lithuania, men aged 34-49-years drink strong alcohol more often than those of other age groups [15]. As far as age and gender are concerned, men over 40 years of age evidently form a specific high-risk group with health-damaging behavior and susceptibility to civilization diseases.

This paper estimates the relationship between income, education and reported alcohol consumption in the study population. It was observed that neither income nor education had impact on alcohol consumption among men. In women, high consumption was more prevalent in the groups with higher education and the highest income. The Finbalt study among Lithuanian women and Finnish men showed that high alcohol consumption was more prevalent in the group with college/university education [15]. Assessment of alcohol consumption is especially problematic in this type of survey, because alcoholics are less likely to respond. Furthermore, the data collected by means of a questionnaire give only an approximate picture of the drinking pattern.

The role of nutrition and diet in reducing the risk of chronic diseases has been well documented. Even reports burdened with bias are unlikely to have exaggerated the true fall in the incidence of ischemic heart disease; nor is

it likely to be mainly due to changes in smoking, drinking, stress, or medical care. Changes in the type of dietary fat and increased supplies of fresh fruit and vegetables seem to be the best candidates [20]. In the present study the use of vegetable oil in food preparation was less prevalent among men than in women, and more prevalent among the better-educated men, the latter is in agreement with the studies carried out in Estonia, Finland and Lithuania [15]. In contrast to the Finbalt study we did not find association between the type of dietary fat and age. However the impact of marital status on the pattern of dietary fat was observed.

It is also interesting and important to note that the presence of chronic illnesses actually decreased the prevalence of daily smoking and the frequency of strong alcohol consumption among men. We showed that people who contracted any of the studied chronic illness had better lifestyle. A large cohort study revealed that men and women with preexisting disease abstain from alcohol and improve their food habits [21]. This could also be an advantage of health promotion campaigns organized in the past years to educate people that proper food habits are one of health-enhancing forms of behavior [22]. However, those advantages were shown to be modest and time-limited [5]. In our study there was no association between health status and food habits or between self-rated health and lifestyle. We may conclude that in our country promotion of healthy food habits, even among people with chronic illnesses, is not sufficient.

In the present study, about 26% of participants were physically active, and men outnumbered women. There was no relation between physical activity and education; this is in agreement with the results reported in the Finbalt study [15]. However, in our study there was no relation between physical activity and age. It is also interesting to note that the effect of income on physical activity was observed in men; the highest prevalence of physical exercise was found among men of the higher income group. In our study, the effect of marital status on physical activity was clearly visible among women; the highest prevalence of physical exercise was observed in the group of single women.

Nevertheless, some limitations of our study must be acknowledged. The methods of data collection (face-to-face

interview) have some disadvantages: interviewers may influence the answers and sensitive questions are difficult to ask. The study was carried out in a local industrial community with high unemployment rate and its results cannot simply be extrapolated to other communities, although the area can be rather considered typical of the country. We cannot rule out a possible reverse causation, since it was a cross sectional study. The response rate was relatively low. However, a similar response rate has been observed in the first mailing in Finland in the Finbalt Health Monitor Survey [15]. The follow-up mailings were an effective way to increase the total response rate, but it was unlikely that they provided an effective way to reach the "hard core" non-respondents [23]. Similar rates are also seen in the majority of other surveys that required citizen collaboration, including (political) voting in Poland. Self-reported alcohol consumption may tend to underestimate actual consumption. However, the findings reported here are consistent with those of the previous studies. This indicates the absence of differential random misclassification that would tend to diminish the association rather than to create spurious trends. Moreover, previous reports have indicated that underreporting applies mainly to problem drinkers, while information provided by those who abstain or consume alcoholic beverages only occasionally is probably more accurate. In the group of the heaviest alcohol drinkers, a questionnaire or interview may not provide reliable information. Alcohol abusers are far less likely than others to participate in epidemiological studies therefore, their purported presence in the non-drinking category is an untenable explanation for the inverse association. Despite these limitations, the data reported here may represent a larger population from industrial areas of Poland and highlight those factors which might contribute to the East-West health gap during socioeconomical changes in Central and Eastern Europe.

To our knowledge, there are a few studies from Eastern Europe addressing the problem of associations between income, education, health status and lifestyle. Based on our findings, we may conclude that education has a strong impact on our lifestyle that affects health. Certain health behaviors such as smoking and strong alcohol consump-

tion were influenced by health status of our participants. Surprisingly, we found no relationship between health status and food habits. Our results suggest that civilization diseases may not be amenable to interventions based on health education campaigns. Our findings also shed light on the processes of healthy aging among men and women, and indicate that interventions aimed at improving health of Polish citizens need to be gender-specific, which was also observed in other populations [24].

As we gain new knowledge about health behaviors, we may be able to more accurately and effectively target preventive services to maximize benefits, minimize harms in the Polish population and help people make healthy choices to increase the quality of their life.

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