# Characteristics of people with the perceived stress in Croatia: the CroHort study

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# Characteristics of People with the Perceived Stress in Croatia: the CroHort Study

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## A B S T R A C T

*This study aimed to assess levels of stress in Croatian adult population using PSS, in a population study (Croatian Adult Cohort Health Study – CroHort). Our results show that the levels of stress were 17.46 (SD=6.73) for men and 18.32 (SD=6.46) for women in Croatia. The lowest levels of stress experienced men living in urban area while women living in rural area had the highest level. Men and women who had university degree had significantly lower level of stress. The lowest levels of stress experienced participants who had much better financial condition than average. In men, stress was associated to weak heart, lower back pain, poor financial condition of the household and high alcohol consumption. In women, stress was associated to poor mental health, poor social functioning, poorer financial condition of the household, higher age, lower education, low monthly income of the household and poor general health.*

***Keywords:** CroHort study, stress, Perceived Stress Scale (PSS), SF-36*

## Introduction

Stress is a growing public health problem with a negative influence on quality of life. It is associated with diseases and conditions such as cardiovascular diseases, cancer and weight gain[1–5]. Previous studies have shown existing relationship between stress and sociodemographic factors (such as higher education), lifestyle and health behavior, such as smoking and physical inactivity.[2,6–8] There are a number of factors that are believed to moderate the impact of psychological stressors, ranging from environmental factors such as social support to more individual factors such as prior experience and coping.

This study aimed to assess levels of stress in Croatian adult population using PSS, in a population study. The association of age, education, financial status and urban or rural setting to stress will be assessed individually. Association of stress and different variables, such as psychosocial risk factors, emotional factors, economic factors, general health status and diseases will be assessed both individually (one variable and stress) and in combination (all variables and stress).

## Materials and Methods

This study is a part of Croatian Adult Health Study (CroHort), a repeated cross-sectional survey of adults aimed at providing a comprehensive community health assessment of Croats, including their access to and use of health care services, health status, and determinants of health such as nutrition, physical activity, smoking and alcohol consumption. This study aimed to collect data on stress in Croatian adult population[9]. Details on CroHort are provided elsewhere[10]. Data collecting was conducted in 2008. Participants were adults of full age who were at home when interviews took place.

A total sample of 3229 respondents was used. Stress was measured using Perceived Stress Scale (PSS) which was designed to measure the stress degree of which situations in one's life are appraised as stressful[11]. PSS consists of 10 questions whish ask the respondent to indicate how often they felt or thought in a certain way in the last month: »In the last month, how often have you been upset because of something that happened unexpectedly?«, «In the last month, how often have you felt that you were unable to control the important things in your life?«, »In the last month, how often have you felt nervous and »stressed«?«, »In the last month, how often have you dealt successfully with irritating life hassles?«, »In the last month, how often have you felt that you were effectively coping with important changes that were occurring in your life?«, »In the last month, how often have

you felt confident about your ability to handle your personal problems?«, »In the last month, how often have you felt that things were going your way?«, »In the last month, how often have you found that you could not cope with all the things that you had to do?«, »In the last month, how often have you been able to control irritations in your life?«, »In the last month, how often have you felt that you were on top of things?«. The answers were scaled from 0 to 4: »never« 0, »almost never« 1, »sometimes« 2, »fairly often« 3, »very often« 4.PSS-10 scores are obtained by reversing the scores on the four positive items, e.g., 0=4, 1=3, 2=2, etc. and then summing across all 10 items. Items 4, 5, 7, and 8 are the positively stated items. One question was added to compare stress at the moment to stress in 2003 (when the first cycle of CroHort took part), answers were scaled from 1 to 5: Compared to the last time you took this survey (in 2003), how would you rate the level of your stress?: »I am much more stressed than then« 1, »I am a little more stressed than then« 2, »I am as much stressed than then« 3, »I am a little less stressed than then« 4, »I am far less stressed than then« 5.

Subjective health status was measured using SF-36 scale[9,12]. SF-36 is a short-form health survey consisting of 36 validated questions. It yields an 8-scale profile of functional health and well-being scores as well as psychometrically-based physical and mental health summary measures and a preference-based health utility index[9,12]. Variables used in this study were: physical functioning, role-physical, bodily pain, general health, vitality, social functioning, role-emotional, mental health, physical component summary, mental component summary.

Variables used to assess cardiovascular risk factors were: smoking, physical activity, BMI, alcohol consumption and nutrition. Illness was investigated using question »Do you suffer from any chronically disease and do you take medicine for your disease« and 19 conditions/chronically diseases in the questionnaire. Participants were asked to state whether they suffer from any of the following: high blood pressure, high blood lipids, high levels of sugar, cardiac infarction, angina pectoris, »weak heart«, stroke, rheum, backache, chronicle bronchitis, asthma, gastritis or gastric ulcer, varicose veins, malignant diseases, osteoporosis, kidney disease, liver disease, mental illness and senility. Possible answers were: »no« 1 and »yes« 2. Participants were asked to accordingly state whether they used medicine for the chronicle disease they suffered from (»no« 1, »yes« 2, »doesn't know«).

Socioeconomic status (SES) was assessed using variables: age (18–34, 35–64, >65), sex, urbanism (whether they lived in an urban or rural area), education (unfinished primary school, finished primary school, high school, college, university degree, unknown), financial condition (much worse than average, somewhat worse than average, average, somewhat better than average, much better than average) and financial status (which was described as average monthly earnings of the household).

Normality of distribution of data was tested using Kolmogorov-Smirnov Test of Normality. Statistical analysis was performed using t-test to compare means of stress levels between men and women, also between urban and rural settings. ANOVA was used to assess levels of stress according to age groups and sex, levels of education and financial condition. Linear regression was performed to assess the impact of examined variables on likelihood that they are associated with stress.

Statistical significance was set at value <0.005 in all analyses. Analysis was performed using SAS version 9.1.3.

## Results

Out of 3229 participants, 3079 answered questions regarding stress. Most of the participants were female (N=2105). Distribution of data was not normal, p<0.001, Kolmogorov-Smirnov Test of Normality (male D(974)= 0.44, p<0.001; female D(2105)=0.47, p<0.001).

On average, men experienced lower levels of stress ($\overline{X}$=17.46, SD=6.73) than women ($\overline{X}$=18.32, SD=6.46), Table 1. This difference was statistically significant t(3077)=–3.35, p<0.001. Men aged between 18 and 34 had the lowest level of stress ($\overline{X}$=15.96, SD=6.6), while women had consistently higher level of stress in all three age groups, having the highest level of stress in age group >65 ($\overline{X}$=19.7, SD=6.66). These differences were statistically significant F(2.3076)=21.9, p<0.05 (ANOVA).

Most of the participants lived in an urban area (605 men, 1230 women). On average, both men ($\overline{X}$=16.48, SD=6.61) and women ($\overline{X}$=17.54, SD=6.57) living in urban area had lower levels of stress. The lowest levels of stress experiences men living in urban area ($\overline{X}$=16.48, SD=6.61) while women living in rural area had the highest level of stress (19.41, SD=6.17), t(2069)=–6.52, p<0.001.

87 men and 350 women had no education, 208 men and 579 women had finished primary school. Most of participants had finished high school (507 men and 875 women). Higher and high education had 425 participants (81 men and 118 women had college degree, 81 and 145 women had university degree).

Both men and women, who didn't finish primary school (for men $\overline{X}$=20.93, SD=7.78, women $\overline{X}$=20.85, SD=6.65) or had only finished primary school (men $\overline{X}$=18.56, SD=6.6, women 19.26, SD= 5.94) had the highest levels of stress. Men ($\overline{X}$=15.3, SD=6.34) and women ($\overline{X}$=15.75, SD=6.42) who had university degree

**TABLE 1**
DISTRIBUTION OF STRESS LEVELS AMONG GENDERS AND AGE GROUPS

| Age | Sex | $\overline{X}$ | N | SD |
|---|---|---|---|---|
| 18–34 | Men | 15.964 | 56 | 6.6029 |
| | Women | 16.925 | 146 | 6.1634 |
| 35–64 | Men | 17.391 | 573 | 6.4746 |
| | Women | 17.706 | 1264 | 6.249 |
| >65 | Men | 17.826 | 345 | 7.1483 |
| | Women | 19.705 | 695 | 6.6593 |

**TABLE 2**
RESULTS OF LINEAR REGRESSION FOR MEN

|  | B | SE B | β |
|---|---|---|---|
| (Constant) | 35.094 | 1.693 |  |
| Mental health (SF-36) | −.205 | .016 | −.586 |
| Stress in 2008 compared to stress in 2003 | −.828 | .219 | −.132 |
| Social functioning (SF-36) | −.031 | .011 | −.119 |
| »Weak heart« | −1.874 | .664 | −.090 |
| Lower back pain | 1.034 | .451 | .074 |
| Financial condition of the household | −.460 | .231 | −.065 |
| Alcohol consumption | 1.207 | .611 | .062 |

$R^2=.77$, $p<0.001$

**TABLE 3**
RESULTS OF LINEAR REGRESSION FOR WOMEN.

|  | B | SE B | β |
|---|---|---|---|
| (Constant) | 39.963 | 1.115 |  |
| Mental health (SF-36) | −.165 | .013 | −.475 |
| Stress in 2008 compared to stress in 2003 | −.998 | .144 | −.189 |
| Social functioning (SF-36) | −.053 | .009 | −.205 |
| Age | .038 | .011 | −.094 |
| Education | −.466 | .166 | −.080 |
| Financial condition of the household | −.617 | .208 | −.087 |
| Monthly income of the household | .000 | .000 | .090 |
| General health (SF-36) | −.020 | .010 | −.064 |

$R^2=.74$, $p<0.001$

had significantly lower level of stress $F(1.3059)=11.03$, $p=0.01$ (ANOVA).

485 participants (150 men and 135 women) estimated their financial condition as much worse than average, 639 (192 men and 447 women) estimated that their financial condition somewhat worse than average, most of the participants (N=1605) estimated it is average (506 men, 1099 women), while 279 participants (106 men, 172 women) estimated it was somewhat better than average and only 44 (13 men and 31 women) estimated it was much better than average. The highest levels of stress experienced participant with much worse than average financial condition (men $\overline{X}=20.63$, SD=6.8) and with somewhat worse than average (men $\overline{X}=18.54$, SD=6.27, women $\overline{X}=19.56$, SD=5.96), with women experiencing higher levels of stress. The lowest levels of stress experienced participants who had much better financial condition than average (men $\overline{X}=10$, SD=6.35, women $\overline{X}=12.13$, SD=5.58). Most of the participants, the ones who had average financial condition had »average« levels of stress (men $\overline{X}=16.85$, SD=6.53, women $\overline{X}=17.41$, SD=6.19). These differences were statistically significant $F(1.3050)=11.63$, $p=0.01$ (ANOVA).

Linear regression model was statistically significant $R^2=.77$, $p<0.001$, for men, with 7 variables (out of 36) contributed to the model (Table 2). Men who had good mental health (SF-36) experienced lower levels of stress. The ones who felt more stressed in 2003, experienced lower levels of stress in 2008. SF-36 component socially functioning was negatively correlated with stress. Two medical conditions were statistically significant: »weak« heart and lower back pain. Men with heart problems had higher levels of stress. Men with lower back pain had higher levels of stress. Lower financial condition of the household was connected with higher levels of stress. Men with lower levels of stress had low alcohol consumption.

Linear regression model for women was also statistically significant $R^2=.74$, $p<0.001$, with 8 variables entering the model (Table 3). Some of the result were similar to the men: women who had good mental health (SF-36) experienced lower levels of stress, the ones who felt more stressed in 2003, experienced lower levels of stress in 2008, women who were socially functioning had lower levels of stress and better financial condition of the household was connected with lower levels of stress. Lower monthly income was connected with lower levels of stress. Higher age was connected with higher levels of stress. Women who have higher levels of education have lower levels of stress. Good general health (SF-36) was strongly connected with lower levels of stress.

## Discussion

Our results show that levels of stress, measured by PSS, were 17.46 for men and 18.32 for women in Croatia. These levels are similar to the study by Hattar-Pollara and Dawani among 93 working women in Jordan ($\overline{X}=$ 17.7, SD=6.6) and study by Marcellini et al. among elderly men and women (aged>69) in Italy, Poland, Germany, Greece and France (N=853, $\overline{X}=17.6$)[13,14]. However, our results are higher compared to the US study by Cohen and Williamson (N=2387, men $\overline{X}=12.1$, SD=5.9, women $\overline{X}=13.7$, SD=6.6) and the study from Denmark by Nielsen et al (N=10,002, men $\overline{X}=10.2$, women, $\overline{X}=11.7$), but show a similar trend in women having higher levels of stress than men[2,15]. According to several studies, results of PSS often show that women have consistently higher scores than men. These differences are attributed to the negatively scored items in the PSS which women often score higher[2,15–17]. However, our results may contribute to the fact that women subjectively experience more stress than men and show a greater worry-disposition[18,19].

Lower or no education was connected with the higher levels of stress. This might be due to the fact that PSS asks whether the person was able to cope with certain situations in life and whether they had the feeling they can control these situations. People with lower level of education are considered to lack resources and feelings of

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control whereas people who have higher level of education have resources to cope with stress[2,20,21]. Also, low educational attainment is associated with poorer employment opportunities, lower earning power and fewer assets through life[20–22]. Our study showed that people with higher education had lower levels of stress which was already proven in previous studies. This might be due to the fact that education shapes income and employment opportunities, sense of control and well-being. [20,21] All of these factors are connected to financial condition and material state. In our study the lowest levels of stress experienced participants with much better than average financial condition, and vice-versa: those who had financial condition much worse than average had the highest levels of stress[23]. Contrary to popular belief, poverty is more common in rural rather than urban areas. [23]In our study, living in urban area is connected to the lower levels of stress. The lowest levels of stress experienced men living in urban area ($\overline{X}$=16.48, SD=6.61) while women living in rural area had the highest level of stress (19.41, SD=6.17), t(2069)=–6.52, p<0.001.

Men and women have different stress responses. There are differences in psychological and biological aspects of stress response. While women more often suffer from autoimmune illnesses (e.g. lupus erythematosus, multiple sclerosis, neurodermatitis), men are more prone to coronary heart diseases and infectious diseases. Women more often develop anxiety, depression, phobias, panic disorders, obsessive-compulsive disorder; men are prone to antisocial behavior, substance abuse or suicide[23]. Also, gender differences exist in people's readiness to perceive and appraise situations as stressful. Women have slightly, but consistently lower self-esteem, self-confidence, self-efficacy and sense of competence[23]. Results of linear regression in our study showed four variables which were associated with stress and which were common for both men and women: mental health (SF-36), comparison of stress at the moment to stress in 2003, social functioning and financial condition of the household. Men had three unique variables which were associated with stress: »weak hear«, lower back pain and alcohol consumption. These results are consistent with recent findings on gender differences and stress response.

Women had four variables which were associated with stress: lower monthly income, higher age, lower level of and no education, and bad general health. Women subjectively experience more stress than men[23]. In our population, linear regression showed that women were loaded with both restrictions of the monthly income and financial condition of the household. Women have often multiple social roles and lower socioeconomic status which is associated with stress. Due to their multiple role, they experience more stress in everyday life[23].

## Conclusion

The results of this study suggest that stress is a burden among responders who live in rural area, have no or only primary education and who have worse than average material state. There are four variables which were associated with stress in both men and women: mental health (SF-36), comparison of stress at the moment to stress in 2003, social functioning and financial condition of the household. Men had also three variables associated to stress: »weak hear«, lower back pain and alcohol consumption, while women had four: lower monthly income, higher age, lower level of and no education, and bad general health.

## Acknowledgments

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**KARAKTERISTIKE OSOBA SA OPAŽENIM STRESOM U HRVATSKOJ: CroHort ISTRAŽIVANJE**

**S A Ž E T A K**

Cilj ove studija je procjena razine stresa u hrvatskoj odrasloj populaciji (CroHort), korištenjem PSS. Naši rezultati pokazuju da je razina stresa 17,46 (SD=6,73) za muškarce i 18,32 (SD=6,46) za žene. Najnižu razinu stresa imali su muškarci koji žive u urbanom području dok su žene koje žive u ruralnom području imale najvišu razinu stresa. Muškarci i žene koji su imali visoku stručnu spremu imali su značajno nižu razinu stresa. Najnižu razina stresa imali su ispitanici koji su imali puno bolje materijalno stanje od prosjeka. U muškaraca, stres je bio povezan s lošijim mentalnim zdravljem, lošim socijalno funkcioniranjem, »slabim srcem«, boli u križima, lošim materijalnim stanjem domaćinstva i višom konzumacijom alkohola. U žena, stres je bio povezan s lošim mentalnim zdravljem, lošim socijalno funkcioniranje, lošim materijalnim stanjem domaćinstva, višom dobi, lošijim obrazovanjem, niskim mjesečnim prihodima domaćinstva i lošim zdravljem.