

Impact of War on Health Related Quality of Life in Croatia: Population Study

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Aim. To present health-related quality of life in post-war Croatia, focusing on the population as a whole rather than on the specific group of people.

Method. The study was conducted in six Croatian counties in the 1997-1999 period. Three of those counties had been directly affected by the 1991-1995 war. The sample consisted of 1,297 randomly selected respondents aged 18 years and older. The questionnaire was anonymous, consisting of questions on sociodemographic characteristics of respondents and Medical Outcome Study 36-item short-form health survey (SF-36). SF-36 comprised the following nine subscales: physical functioning (PF), role-physical (RP), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role-emotional (RE), mental health (MH), and health transition (HT).

Results. Mean subscale scores for the areas directly affected by war were PF 64.21; RP 52.70; BP 59.35; GH 49.02; VT 49.52; SF 68.29; RE 63.02; MH 57.95; HT 41.28; and for the areas not affected by war were PF 65.35; RP 62.01; BP 61.79; GH 50.45; VT 49.40; SF 71.41; RE 74.11; MH 60.33; HT 45.14. The two areas differed significantly in RP ($p < 0.001$), SF ($p = 0.035$), RE ($p < 0.001$), MH ($p = 0.038$), and HT ($p = 0.003$). Respondents living in the areas directly affected by war achieved lower total health-related quality of life scores. Younger respondents, respondents with secondary education, and those with lower income were the groups mostly affected by war.

Conclusion. War affects self-perceived health, physical ability, and emotional and mental health of the entire population affected by war, especially younger age groups, those with lower education, and lower income.

Key words: Croatia; education; income; quality of life; war

Ways in which war affects human existence are constantly explored. Health consequences of war traumas on soldiers and war veterans (1-7) and post-traumatic stress disorder in war victims (8-12) were extensively investigated, as well as problems of refugees and displaced persons (13-18). However, these studies were oriented towards specific groups of people affected by war.

The 1991-1995 war against Croatia caused demographic losses and left deep psychosocial scars. War damages were estimated at US\$37.4 billion, up to 20,000 persons have been reported killed or missing, and more than 30,000 people have been disabled as a result of the war (19). Approximately 27,000 square kilometers (or 47.5% of Croatian continental territory) with approximately 1.5 million inhabitants were affected by war (20). At the end of 1991, as much as 11.5% of population lived in partly or completely occupied area (21). The country was flooded by displaced persons and refugees from neighboring Bosnia and Herzegovina. During the period from 1992 to 1998 the number of refugees and displaced persons was between 430,000 and 700,000 (22).

The World Health Organization's definition of health as a state of complete physical, social, and mental well-being, and not merely the absence of disease or infirmity is generally regarded as a definition of health-related quality of life (23,24). The population quality of life is a highly vulnerable parameter, crucial in health care policy. Since the population of Croatia has experienced war in recent past, we decided to investigate health-related quality of life in post-war Croatia, starting with the hypothesis that the quality of life was lower in the areas that had been more severely affected by war. We focused on the population as a whole, not on the specific group of people, and explored the effect of war experience on their quality of life, using the Medical Outcome Study 36-item short-form health survey (SF-36). SF-36 is the model widely used as a generic short-form measure of functional health and well-being of different population groups and has been applied in hundreds of studies (25).

Subjects and Methods

The study was conducted in Croatia in the 1997-1999 period, and covered six counties: three affected and three non-af-

affected by war (Table 1). A county was defined as war-affected if it was under occupation and/or constant armed attacks during the war period, and as non-affected if it was not under occupation and was under armed attacks sporadically.

Table 1. Respondents included in the health survey by counties in war-affected or non-affected areas of Croatia, 1997-1999

| County | No. (%) of respondents |
|------------------------|------------------------|
| War-affected: | |
| Šibensko-kninska | 220 (16.9) |
| Vukovarsko-srijemska | 180 (13.9) |
| Osječko-baranjska | 202 (15.6) |
| subtotal | 602 (46.4) |
| War non-affected: | |
| Zagrebačka | 220 (16.9) |
| Koprivničko-križevačka | 216 (16.7) |
| Primorsko-goranska | 259 (20.0) |
| subtotal | 695 (53.6) |
| Total | 1,297 (100.0) |

Subjects

Study sample consisted of 1,297 respondents: 602 from war-affected and 695 from non-affected area (Table 2). The age range was 18-93 years. The mean age of respondents was 50.8 ± 17.3 years for war-affected area, and 51.5 ± 18.6 years for non-affected area. Respondents were divided into three income groups, as follows: low (less than 1,500 HRK per household monthly), medium (1,500-3,500 HRK per household monthly), and high (more than 3,500 HRK per household monthly).

Table 2. Sociodemographic characteristics of the sample of respondents in Croatia, 1997-1999 (N = 1,297)

| Parameter | No. (%) of respondents in area | | |
|---------------------|--------------------------------|--------------|---------------|
| | war-affected | non-affected | total |
| Sex: | | | |
| men | 232 (17.9) | 255 (19.7) | 487 (37.6) |
| women | 370 (28.5) | 440 (33.9) | 810 (62.4) |
| Age (years): | | | |
| 18-24 | 49 (3.8) | 71 (5.5) | 120 (9.3) |
| 25-44 | 186 (14.3) | 174 (13.4) | 360 (27.7) |
| 45-64 | 209 (16.1) | 244 (18.8) | 453 (34.9) |
| ≥65 | 158 (12.2) | 206 (15.9) | 364 (28.1) |
| Years of education: | | | |
| ≤8 | 243 (18.7) | 251 (19.4) | 494 (38.1) |
| 11-12 | 277 (21.4) | 341 (26.3) | 618 (47.7) |
| ≥14 | 82 (6.3) | 103 (7.9) | 185 (14.2) |
| Income: | | | |
| low | 205 (15.8) | 174 (13.4) | 379 (29.2) |
| medium | 254 (19.6) | 305 (23.5) | 559 (43.1) |
| high | 143 (11.0) | 216 (16.7) | 359 (27.7) |
| Total | 602 (46.4) | 695 (53.6) | 1,297 (100.0) |

The sampling strategy was a stratified multistage sampling. In the first stage, a random sample of health care centers within the counties was made. Health care centers were chosen because every citizen in Croatia is registered with a general practitioner working in a health care center. In the second stage, a 10% random sample of the population under care of general practitioners within health care centers was taken. Only persons aged 18 years and over were included in the study. If a younger person was to be selected according to the list of random numbers, they were skipped and the next referred person was interviewed. The selected inhabitants who gave their informed consent were interviewed in their homes. Each interview took about 30 minutes and was done by trained interviewers, students of the Zagreb University Medical School. The response rate was 96.0%.

Questionnaire

The questionnaire was anonymous, consisting of a series of questions on socio-demographic characteristics of respondents, including age, sex, education, and income per household, and the Medical Outcome Study 36-item short-form health survey (SF-36). The SF-36 survey contains 36 questions and yields a nine-subscale profile of scores (25): Physical Functioning, Role-

Physical, Bodily Pain, General Health, Vitality, Social Functioning, Role-Emotional, Mental Health, and Health Transition. Each scale describes a certain aspect of functional health (Table 3). The Croatian version of the SF-36 questionnaire was licensed to Andrija Štampar School of Public Health in 1992 as a part of the project "Tipping the Balance towards Primary Healthcare Network", and validated on the general population in Croatia (26,27).

Table 3. Description of subscales of Medical Outcome Study 36-item short-form used to assess the health of Croatian population, 1997-1999

| Subscale | Description |
|----------------------|--|
| Physical functioning | Ability to perform vigorous and moderate activities, lift or carry groceries, climb the stairs, bend, kneel, or stoop, walk, bathe or dress |
| Role-physical | Cutting down the amount of time spent on activities, accomplishing less, feeling limited in physical activities due to physical difficulties |
| Bodily pain | Intensity of bodily pain and interference of pain with usual activities |
| General health | Self-perceived health, perception of getting ill more easily than others, expectation of health worsening, feeling healthy as others |
| Vitality | Feeling full of energy, or worn out and tired |
| Social functioning | Extent and frequency of interference of physical health and emotional problems with social activities |
| Role-emotional | Cutting down the amount of time spent on activities or accomplishing less due to emotional problems |
| Mental health | Feeling nervous, downhearted and sad or calm, peaceful and happy |
| Health transition | Health at the present moment compared to health a year ago |

Statistics

Each SF-36 scale score was transformed to a 0 to 100 scale. The transformation converted the lowest and highest possible scores to 0 and 100, respectively. A score between those values represented the percentage of the total possible score achieved. Data on SF-36 scales were expressed as a mean value and inter-quartile range. Since the data distribution was very skewed, the standard deviation was not a good measure of variability and the inter-quartile range was used as an alternative.

For comparison of the two areas, independent samples t-test was used. Differences in socio-demographic characteristics (sex, age, education, and income) of respondents in war-affected and non-affected area were tested by a chi-square test. A probability value of $p < 0.05$ (two-tailed) indicated a statistically significant difference.

Results

There were no significant differences between the war-affected and non-affected areas regarding sex, age, and educational level of respondents. However, significant difference between war-affected and war non-affected areas was found regarding income. There were more respondents in low-income group in war-affected area (chi-square = 15.001, $df = 2$, $p < 0.001$).

On the SF-36 subscales, the mean scores ranged from 41.28 for Health Transition to 68.29 for Social Functioning in war-affected area and from 45.14 for Health Transition to 74.11 for Role-Emotional in non-affected area. The differences in scores between the two groups were analyzed by a t-test. War-affected and war non-affected areas differed significantly in five items: Role-Physical, Social Functioning,

ning, Role-Emotional, Mental Health, and Health Transition, with scores being higher in the area not affected by war (Table 4).

Sex Differences

Mean SF-36 subscale scores for men ranged from 41.70 for Health Transition to 70.50 for Social Functioning in war-affected area, and from 45.29 for Health Transition to 76.21 for Role-Emotional in non-affected area. Mean SF-36 subscale scores for women ranged from 41.01 for Health Transition to 66.91 for Social Functioning in war-affected area, and from 45.06 for Health Transition to 72.89 for Role-Emotional in war non-affected area.

Significant differences in scores between men in war-affected and non-affected areas were found for Role-Physical, Role-Emotional, and Mental Health subscales. The scores were higher in war non-affected area. Significant differences in scores between women in war-affected and non-affected areas were found for Role-Physical, Role-Emotional, and Health Transition subscales. The scores were higher for women in area not affected by war (Table 5).

Age Differences

Mean SF-36 subscale scores for respondents who were 18 to 24 years old ranged from 52.04 for Health Transition to 93.90 for Role-Emotional in war-affected area, and from 56.69 for Health Transition to

92.25 for Physical Functioning in non-affected area. Mean SF-36 subscale scores for respondents between 25 and 44 years of age ranged from 45.56 for Health Transition to 76.37 for Physical Functioning in war-affected area, and from 51.44 for Health Transition to 81.03 for Role-Emotional subscale in war non-affected area. Mean subscale scores for respondents between 45 and 64 years of age ranged from 38.04 for Health Transition to 66.81 for Social Functioning in war-affected area, and from 45.90 for Health Transition to 73.80 for Role-Emotional in non-affected area. Mean subscale scores for respondents older than 65 ranged from 37.18 for Health Transition to 60.64 for Social Functioning in war-affected area, and from 34.95 for Health Transition to 63.58 for Role-Emotional in non-affected area.

In the 18-24 year-old age group, significant differences between respondents in war-affected and non-affected areas were found in Bodily Pain and Vitality subscale scores. Respondents in war-affected area had lower scores in Bodily Pain, but higher in Vitality. Respondents from war-affected and non-affected areas, who were between 25 and 44 years of age, showed significant differences in Role-Physical, Bodily Pain, General Health, Social Functioning, Role-Emotional, Mental Health, and Health Transition subscale scores. The scores for all seven scales were lower in war-affected area. In the 45-64 year-old age group, significant differences were found be-

Table 4. Health status of Croatian population in war-affected and non-affected areas, according to their mean scores on Medical Outcome Study 36-item short-form subscales, 1997-1999

| Scale | Mean score (Q1-Q3) in area ^a | | t | p |
|----------------------|---|----------------------|--------|--------|
| | war-affected | non-affected | | |
| Physical functioning | 64.21 (40.00-95.00) | 65.35 (40.00-95.00) | 0.649 | 0.517 |
| Role-physical | 52.70 (0.00-100.00) | 62.01 (0.00-100.00) | 3.810 | <0.001 |
| Bodily pain | 59.35 (33.00-89.00) | 61.79 (44.00-89.00) | 1.447 | 0.148 |
| General health | 49.02 (30.00-65.00) | 50.45 (35.00-65.00) | 1.138 | 0.255 |
| Vitality | 49.52 (35.00-65.00) | 49.40 (35.00-65.00) | -0.093 | 0.926 |
| Social functioning | 68.29 (50.00-100.00) | 71.41 (50.00-100.00) | 2.111 | 0.035 |
| Role-emotional | 63.02 (0.00-100.00) | 74.11 (33.00-100.00) | 4.711 | <0.001 |
| Mental health | 57.95 (44.00-76.00) | 60.33 (48.00-72.00) | 2.080 | 0.038 |
| Health transition | 41.28 (25.00-50.00) | 45.14 (25.00-50.00) | 2.955 | 0.003 |

^aScore range: 0-100. The interquartile range (Q1-Q3) is a measure of dispersion. It is the difference between the 75th percentile (Q3) and the 25th percentile (Q1).

Table 5. Health status of men and women in war-affected and non-affected areas of Croatia, according to their mean scores on Medical Outcome Study 36-item short-form subscales, 1997-1999

| Subscale | Men | | | | Women | | | |
|----------------------|---|-------------------------|--------|-------|---|-------------------------|-------|--------|
| | mean score (Q1-Q3) in area ^a | | t | p | mean score (Q1-Q3) in area ^a | | t | p |
| | war-affected | non-affected | | | war-affected | non-affected | | |
| Physical functioning | 67.00 (45.00-95.00) | 68.20 (40.00-100.00) | 0.426 | 0.670 | 62.46 (35.00-95.00) | 63.69 (40.00-95.00) | 0.554 | 0.580 |
| Role-physical | 52.02 (0.00-100.00) | 65.98 (25.00-100.00) | 3.281 | 0.001 | 52.50 (0.00-100.00) | 59.71 (0.00-100.00) | 2.327 | 0.020 |
| Bodily pain | 61.19 (33.00-100.00) | 65.56 (44.00-100.00) | 1.580 | 0.115 | 58.19 (33.00-78.00) | 59.61 (33.00-89.00) | 0.665 | 0.506 |
| General health | 49.03 (30.00-65.00) | 51.14 (35.00-65.00) | 0.996 | 0.320 | 49.01 (35.00-65.00) | 50.05 (35.00-65.00) | 0.668 | 0.504 |
| Vitality | 51.72 (35.00-70.00) | 51.00 (40.00-65.00) | -0.358 | 0.721 | 48.14 (30.00-65.00) | 48.48 (35.00-65.00) | 0.218 | 0.827 |
| Social functioning | 70.50 (50.00-100.00) | 73.26 (50.00-100.00) | 1.172 | 0.242 | 66.91 (50.00-88.00) | 70.34 (50.00-88.00) | 1.813 | 0.070 |
| Role-emotional | 64.60 (0.00-100.00) | 76.21 (67.00-100.00) | 3.109 | 0.002 | 61.99 (0.00-100.00) | 72.89 (33.00-100.00) | 3.589 | <0.001 |
| Mental health | 58.59 (44.00-76.00) | 62.15 (52.00-76.00) | 1.972 | 0.049 | 57.56 (44.00-72.00) | 59.27 (48.00-72.00) | 1.163 | 0.245 |
| Health transition | 41.70 (25.00-50.00) | 45.29 (25.00-50.00) | 1.822 | 0.069 | 41.01 (25.00-50.00) | 45.06 (25.00-50.00) | 2.338 | 0.020 |

^aScore range: 0-100. The interquartile range (Q1-Q3) is a measure of dispersion. It is the difference between the 75th percentile (Q3) and the 25th percentile (Q1).

tween respondents from war-affected and non-affected areas in Role-Physical, General Health, Role-Emotional, Mental Health, and Health Transition subscale scores. The scores were lower in war-affected area. There were no significant differences in scores between respondents 65 years of age and older in war-affected and non-affected areas (Table 6).

Educational Differences

Mean SF-36 subscale scores for respondents with complete or incomplete elementary education in war-affected area ranged from 37.55 for Health Transition to 63.78 for Social Functioning, and in non-affected area from 39.44 for Health Transition to 66.13 for Role-Emotional. Respondents with vocational/trade or high school education achieved scores that

ranged from 43.59 for Health Transition to 72.38 for Social Functioning in war-affected area, and from 49.05 for Health Transition to 80.36 for Role-Emotional in non-affected area. Mean SF-36 subscale scores for respondents with 2-year college or university education ranged from 44.51 for Health Transition to 74.09 for Physical Functioning in war-affected area, and from 46.12 for Health Transition to 73.83 for Social Functioning in non-affected area.

Respondents with primary school education in war non-affected area achieved significantly higher score in Role-Emotional than those in war-affected area. Significant differences between respondents with vocational/trade or high school education in war-affected and non-affected areas were found in Role-Physical, Bodily Pain, Role-Emotional, and Health Transition

Table 6. Health status of Croatian population in war-affected and non-affected areas by age, according to their mean scores on Medical Outcome Study 36-item short-form subscales, 1997-1999

| Subscale | Age groups (years) | | | | | | | | | | | | | | | |
|----------------------|---|--------------------------|--------|-------|---|-------------------------|-------|--------|---|-------------------------|-------|--------|---|------------------------|--------|-------|
| | 18-24 | | | | 25-44 | | | | 45-64 | | | | ≥65 | | | |
| | mean score (Q1-Q3) in area ^a | | t | p | mean score (Q1-Q3) in area ^a | | t | p | mean score (Q1-Q3) in area ^a | | t | p | mean score (Q1-Q3) in area ^a | | t | p |
| war-affected | non-affected | war-affected | | | non-affected | war-affected | | | non-affected | war-affected | | | non-affected | | | |
| Physical functioning | 87.65 (95.00-100.00) | 92.25 (95.00-100.00) | 1.091 | 0.279 | 76.37 (65.00-100.00) | 80.32 (70.00-100.00) | 1.347 | 0.179 | 59.81 (35.00-85.00) | 64.04 (40.00-90.00) | 1.547 | 0.123 | 48.45 (30.00-70.00) | 44.98 (20.00-70.00) | -1.153 | 0.250 |
| Role-physical | 84.18 (75.00-100.00) | 86.97 (100.00-100.00) | 0.511 | 0.610 | 65.05 (25.00-100.00) | 78.74 (75.00-100.00) | 3.322 | 0.001 | 43.18 (0.00-100.00) | 57.27 (0.00-100.00) | 3.388 | 0.001 | 40.98 (0.00-100.00) | 44.90 (0.00-100.00) | 0.860 | 0.390 |
| Bodily pain | 79.67 (67.00-100.00) | 87.86 (78.00-100.00) | 2.041 | 0.045 | 66.53 (44.00-100.00) | 75.31 (56.00-100.00) | 3.062 | 0.002 | 54.30 (33.00-100.00) | 57.63 (44.00-100.00) | 1.205 | 0.229 | 51.27 (27.00-100.00) | 46.32 (22.00-67.00) | -1.607 | 0.109 |
| General health | 73.67 (65.00-85.00) | 70.07 (60.00-80.00) | -1.134 | 0.259 | 57.37 (40.00-75.00) | 61.72 (55.00-75.00) | 2.082 | 0.038 | 43.13 (25.00-60.00) | 47.19 (35.00-60.00) | 2.048 | 0.041 | 39.34 (25.00-55.00) | 38.01 (25.00-50.00) | -0.666 | 0.506 |
| Vitality | 74.18 (60.00-90.00) | 63.60 (55.00-75.00) | -3.130 | 0.002 | 52.71 (40.00-65.00) | 56.09 (45.00-70.00) | 1.625 | 0.105 | 46.67 (30.00-60.00) | 48.38 (35.00-60.00) | 0.858 | 0.392 | 41.87 (25.00-55.00) | 40.05 (25.00-55.00) | -0.773 | 0.440 |
| Social functioning | 87.3 (75.00-100.00) | 83.62 (75.00-100.00) | -1.116 | 0.267 | 71.44 (50.00-100.00) | 79.15 (63.00-100.00) | 2.914 | 0.004 | 66.81 (50.00-88.00) | 70.07 (50.00-88.00) | 1.347 | 0.179 | 60.64 (38.00-88.00) | 62.27 (50.00-88.00) | 0.565 | 0.572 |
| Role-emotional | 93.90 (100.00-100.00) | 88.75 (100.00-100.00) | -1.170 | 0.244 | 65.24 (0.00-100.00) | 81.03 (67.00-100.00) | 3.818 | <0.001 | 59.18 (0.00-100.00) | 73.80 (67.00-100.00) | 3.655 | <0.001 | 55.91 (0.00-100.00) | 63.58 (0.00-100.00) | 1.592 | 0.112 |
| Mental health | 74.37 (64.00-84.00) | 70.48 (64.00-80.00) | -1.303 | 0.195 | 60.28 (48.00-76.00) | 65.33 (56.00-76.00) | 2.595 | 0.010 | 55.69 (40.00-72.00) | 60.43 (48.00-76.00) | 2.454 | 0.015 | 53.11 (40.00-68.00) | 52.49 (40.00-68.00) | -0.284 | 0.776 |
| Health transition | 52.04 (50.00-50.00) | 56.69 (50.00-75.00) | 1.409 | 0.161 | 45.56 (25.00-50.00) | 51.44 (50.00-50.00) | 2.534 | 0.012 | 38.04 (25.00-50.00) | 45.90 (25.00-50.00) | 3.677 | <0.001 | 37.18 (25.00-50.00) | 34.95 (25.00-50.00) | -0.855 | 0.393 |

^aScore range: 0-100. The interquartile range (Q1-Q3) is a measure of dispersion. It is the difference between the 75th percentile (Q3) and the 25th percentile (Q1).

Table 7. Health status of Croatian population in war-affected and non-affected areas by years of education, according to their mean scores on Medical Outcome Study 36-item short-form subscales, 1997-1999

| Subscale | Years of education | | | | | | | | | | | |
|----------------------|---|------------------------|--------|-------|---|-------------------------|-------|--------|---|-------------------------|--------|-------|
| | ≤8 | | | | 11-12 | | | | ≥14 | | | |
| | mean score (Q1-Q3) in area ^a | | t | p | mean score (Q1-Q3) in area ^a | | t | p | mean score (Q1-Q3) in area ^a | | t | p |
| war-affected | non-affected | war-affected | | | non-affected | war-affected | | | non-affected | | | |
| Physical functioning | 54.88 (30.00-80.00) | 53.21 (25.00-80.00) | -0.613 | 0.540 | 69.48 (45.00-100.00) | 71.74 (50.00-100.00) | 0.927 | 0.354 | 74.09 (50.00-100.00) | 73.74 (60.00-100.00) | -0.077 | 0.938 |
| Role-physical | 43.52 (0.00-100.00) | 49.30 (0.00-100.00) | 1.453 | 0.147 | 56.77 (0.00-100.00) | 69.57 (25.00-100.00) | 3.700 | <0.001 | 66.16 (25.00-100.00) | 67.96 (25.00-100.00) | 0.297 | 0.767 |
| Bodily pain | 53.36 (33.00-78.00) | 51.04 (22.00-78.00) | -0.848 | 0.397 | 62.44 (44.00-100.00) | 68.26 (44.00-100.00) | 2.434 | 0.015 | 66.67 (44.00-89.00) | 66.58 (44.00-89.00) | -0.022 | 0.982 |
| General health | 41.83 (25.00-55.00) | 42.71 (25.00-55.00) | 0.465 | 0.645 | 53.09 (35.00-70.00) | 54.49 (40.00-70.00) | 0.768 | 0.443 | 56.59 (40.00-75.00) | 55.92 (40.00-70.00) | -0.214 | 0.831 |
| Vitality | 42.86 (25.00-60.00) | 41.93 (25.00-55.00) | -0.477 | 0.634 | 53.77 (40.00-70.00) | 53.84 (40.00-70.00) | 0.039 | 0.969 | 54.88 (40.00-70.00) | 52.91 (40.00-65.00) | -0.609 | 0.543 |
| Social functioning | 63.78 (38.00-88.00) | 64.35 (50.00-88.00) | 0.237 | 0.813 | 72.38 (50.00-100.00) | 75.88 (63.00-100.00) | 1.705 | 0.089 | 67.88 (50.00-100.00) | 73.83 (50.00-100.00) | 1.562 | 0.120 |
| Role-emotional | 52.81 (0.00-100.00) | 66.13 (0.00-100.00) | 3.266 | 0.001 | 70.41 (33.00-100.00) | 80.36 (67.00-100.00) | 3.149 | 0.002 | 68.30 (33.00-100.00) | 72.83 (33.00-100.00) | 0.768 | 0.443 |
| Mental health | 52.41 (36.00-68.00) | 54.34 (44.00-68.00) | 1.026 | 0.305 | 61.33 (48.00-76.00) | 63.64 (52.00-76.00) | 1.443 | 0.149 | 62.98 (52.00-80.00) | 63.96 (52.00-76.00) | 0.348 | 0.728 |
| Health transition | 37.55 (25.00-50.00) | 39.44 (25.00-50.00) | 0.819 | 0.413 | 43.59 (25.00-50.00) | 49.05 (50.00-50.00) | 3.136 | 0.002 | 44.51 (25.00-50.00) | 46.12 (25.00-50.00) | 0.993 | 0.623 |

^aScore range: 0-100. The interquartile range (Q1-Q3) is a measure of dispersion. It is the difference between the 75th percentile (Q3) and the 25th percentile (Q1).

Table 8. Health status of Croatian population in war-affected and non-affected areas by their income, according to their mean scores on Medical Outcome Study 36-item short-form subscales, 1997-1999

| Subscale | Income | | | | | | | | | | | |
|----------------------|---|-------------------------|-------|--------|---|-------------------------|--------|-------|---|-------------------------|--------|-------|
| | low | | | | medium | | | | high | | | |
| | mean score (Q1-Q3) in area ^a | | t | p | mean score (Q1-Q3) in area ^a | | t | p | mean score (Q1-Q3) in area ^a | | t | p |
| Physical functioning | 65.54 (40.00-95.00) | 70.20 (50.00-100.00) | | | 1.783 | 0.075 | | | 64.11 (40.00-95.00) | 63.10 (35.00-95.00) | | |
| Role-physical | 57.56 (0.00-100.00) | 71.84 (50.00-100.00) | 3.309 | 0.001 | 50.49 (0.00-100.00) | 58.61 (0.00-100.00) | 2.153 | 0.032 | 49.65 (0.00-100.00) | 58.91 (0.00-100.00) | 1.967 | 0.050 |
| Bodily pain | 60.39 (33.00-89.00) | 69.50 (44.00-100.00) | 2.996 | 0.003 | 59.49 (33.00-89.00) | 57.15 (33.00-78.00) | -0.890 | 0.374 | 57.62 (38.50-83.50) | 62.13 (44.00-89.00) | 1.420 | 0.156 |
| General health | 50.88 (35.00-65.00) | 54.48 (40.00-70.00) | 1.592 | 0.112 | 48.96 (30.00-65.00) | 49.18 (30.00-65.00) | 0.113 | 0.910 | 46.47 (30.00-65.00) | 48.98 (35.00-65.00) | 1.092 | 0.275 |
| Vitality | 49.71 (35.00-65.00) | 54.17 (40.00-70.00) | 1.993 | 0.047 | 50.69 (35.00-70.00) | 47.57 (33.00-60.00) | -1.597 | 0.111 | 47.17 (30.00-60.00) | 48.15 (35.00-60.00) | 0.423 | 0.673 |
| Social functioning | 68.67 (50.00-88.00) | 76.63 (63.00-100.00) | 3.146 | 0.002 | 68.91 (50.00-100.00) | 69.99 (50.00-100.00) | 0.471 | 0.638 | 66.65 (50.00-88.00) | 69.23 (50.00-88.00) | 0.882 | 0.378 |
| Role-emotional | 60.96 (0.00-100.00) | 77.41 (67.00-100.00) | 3.911 | <0.001 | 63.14 (0.00-100.00) | 71.25 (33.00-100.00) | 2.192 | 0.029 | 65.76 (0.00-100.00) | 75.48 (67.00-100.00) | 2.177 | 0.030 |
| Mental health | 56.72 (44.00-72.00) | 64.44 (52.00-80.00) | 3.744 | <0.001 | 59.07 (44.00-76.00) | 59.15 (48.00-72.00) | 0.043 | 0.966 | 57.73 (46.00-72.00) | 58.69 (48.00-72.00) | 0.435 | 0.663 |
| Health transition | 41.10 (25.00-50.00) | 50.14 (50.00-50.00) | 3.752 | <0.001 | 40.45 (25.00-50.00) | 43.93 (25.00-50.00) | 1.804 | 0.072 | 43.01 (25.00-50.00) | 42.82 (25.00-50.00) | -0.069 | 0.945 |

^aScore range: 0-100. The interquartile range (Q1-Q3) is a measure of It is the difference between the 75th percentile (Q3) and the 25th percentile (Q1).

subscale scores. The scores were higher in war non-affected area. There were no significant differences in mean subscale scores between respondents with 2-year college or university education in war-affected and non-affected areas (Table 7).

Income Differences

Mean scores for respondents in low-income group ranged from 41.10 for Health Transition to 68.67 for Social Functioning subscale in war-affected area, and from 50.14 for Health Transition to 77.41 for Role-Emotional subscale in war non-affected area. Mean scores for respondents in medium-income group ranged from 40.45 for Health Transition to 68.91 for Social Functioning subscale in war-affected area and from 43.93 for Health Transition to 71.25 for Role-Emotional subscale in war non-affected area. High-income group's scores ranged from 43.01 for Health Transition to 66.65 for Social Functioning subscale in war-affected area, and from 42.82 for Health Transition to 75.48 for Role-Emotional subscale in non-affected area.

Significant differences between respondents in war-affected and non-affected areas in low-income group were found for Role-Physical, Bodily Pain, Vitality, Social Functioning, Role-Emotional, Mental Health, and Health Transition subscales. Scores were lower for all seven scales in war-affected area. Respondents in medium-income group in war-affected area had significantly lower scores in Role-Physical and Role-Emotional subscales, and respondents in high-income group in war-affected area had significantly lower score in Role-Emotional subscale (Table 8).

Discussion

Respondents living in areas affected by war generally achieved lower scores for the following five subscales: Role-Physical, Social Functioning, Role-Emotional, Mental Health, and Health Transition. Wherever there were differences between the scale scores, they pointed at the same direction – scores were lower in area directly affected by war. Role-Emotional and Role-Physical subscales almost always

showed the difference between the two areas, whether the differences were observed regarding sex, age, education or income. Health Transition and Mental Health subscales also commonly revealed the difference between the areas. The subscale that did not differ between the two areas was Physical Functioning.

Physical Functioning is a relatively "objective" indicator of physical health because it describes physical ability. Lack of difference in Physical Functioning between the two areas could be interpreted as a non-existence of real differences in physical health in those areas. On the other hand, Role-Physical describes limitations and difficulties in performing every day duties as well as cutting down the amount of time spent on activities. Having in mind the fact that there were no differences in Physical Functioning, this could be attributable to self-perceived inability to function in everyday activities. Role-Emotional is a subscale that is in a way an analogue of Role-Physical. It comprises cutting down the amount of time spent on activities, inability to work carefully, and accomplishing less (25). It is related to feeling incapable for daily activities. Health Transition is a subscale that describes health at the present moment compared with health a year ago (25). It shows the dynamics of change in self-perceived health. In this study, the change in negative direction was more prominent in war-affected area. Mental Health subscale describes feelings of happiness, calmness, and peacefulness or feelings of downheartedness and nervousness. This scale measures depression and feeling of anxiety. The research work on psychiatric illness and mental disorders by Kajević and Klein (28) showed an increase and worsening of psychiatric morbidity due to the war stress, but the study was oriented towards the specific group of exposed population. Results of our study showed that mental health is worse in the whole population directly affected by war.

The finding that draws attention is that in the 18-24 age group, respondents from war-affected and non-affected areas differed in Bodily Pain and Vitality. The score for Bodily Pain was lower in war-af-

affected area, but the score for Vitality was higher in war-affected area, which is inconsistent with the other findings from this study.

Respondents older than 65 years of age did not differ in the quality of life parameters. However, comparison of our results with the results from the recent study from eight health districts in six European countries showed that the scores in our study were lower (29). Heslin et al (29) compared Mental Health, Physical Functioning, and General Health of elderly people in Sweden (Jämtland), Finland (Porvoo), the United Kingdom (North Staffordshire, Dudley, and Morgannwg), Ireland (South East), Spain (Andalusia), and Croatia (Istria). Our results were lower in older respondents for all three scales.

When analyzing the respondents according to their educational level, it became clear that there were no differences in health-related quality of life in the two areas between the respondents with university education. Those with elementary school education differed in only one scale – Role-Emotional. The mostly affected were those with secondary and vocational school education – they scored lower for Role-Physical, Role-Emotional, Bodily Pain, and Health Transition.

Income was another parameter that made a difference between respondents in the two observed areas – the lower the income, the larger the difference between the two areas. Respondents in the low-income group in the area affected by war had lower scores than respondents in area not affected by war in as many as seven subscales: Role-Physical, Bodily Pain, Vitality, Social Functioning, Role-Emotional, Mental Health, and Health Transition. Respondents with high income differed only in Role-Emotional subscale scores.

The scales that marked the difference in health-related quality of life between the two areas – Role-Physical, Social Functioning, Role-Emotional, Mental Health, and Health Transition, are quality of life indicators that are susceptible to external influences and, as such, could indicate inadequate living environment due to war consequences. Younger respondents, respondents with secondary and vocational school education, and those with lower income represented the groups that were mostly affected by war.

This study is only a description of health-related quality of life and did not take morbidity into account. It was not our intention to focus on morbidity; we merely wanted to present summary quality of life in two areas of the country affected by war. We did not collect information on migrations and direct war involvement of respondents, although these additional data could shed more light on causes of differences presented in this study. Having in mind these limitations, we feel that this research nevertheless shows the affect of war on population health in general. Findings from our study lead to a conclusion that war affects self-perceived health and physical ability as well as emotional and mental health of entire population stricken by war. Younger persons with lower income and vocational or secondary school education are identified as the most vulnerable groups of popu-

lation. This information gives a small contribution to a large body of evidence on effect of war on different population groups. It could be useful in public health efforts to recognize specific needs of population groups in order to reduce morbidity and improve population quality of life.

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References

- 1 Unwin C, Blatchley N, Coker W, Ferry S, Hotopf M, Hull L, et al. Health of UK servicemen who served in Persian Gulf War. *Lancet* 1999;353:169-78.
- 2 Gray GC, Coate BD, Anderson CM, Kang HK, Berg SW, Wignall FS, et al. The postwar hospitalization experience of U.S. veterans of the Persian Gulf War. *N Engl J Med* 1996;335:1505-13.
- 3 Fukuda K, Nisenbaum R, Stewart G, Thompson WW, Robin L, Washko RM, et al. Chronic multisymptom illness affecting Air Force veterans of the Gulf War. *JAMA* 1998;280:981-8.
- 4 The Iowa Persian Gulf Study Group. Self-reported illness and health status among Gulf War veterans. A population-based study. *JAMA* 1997;277:238-45.
- 5 Penavić S. Case-mix analysis in veterans' care institutions in Croatia. *Croat Med J* 1995;36:134-7.
- 6 Health status of Vietnam veterans II: physical health. Centers for Disease Control Vietnam Experience Study. *JAMA* 1988;259:2708-14.
- 7 O'Toole B, Marshall R, Grayson D, Schureck RJ, Dobson M, Ffrench M, et al. The Australian Vietnam veterans health study, II: self-reported health of veterans compared with the Australian population. *Int J Epidemiol* 1996;25:319-30.
- 8 Orr SP, Pitman RK, Lasko NB, Herz LR. Psychophysiological assessment of post-traumatic stress disorder imagery in World War II and Korean combat veterans. *J Abnorm Psychol* 1993;102:152-9.
- 9 Pitman RK, Orr SP, Fergusson DF, Altman B, de Jong JB, Herz LR. Psychophysiological responses to combat imagery of Vietnam veterans with post-traumatic stress disorder versus other anxiety disorders. *J Abnorm Psychol* 1990;99:49-54.
- 10 Roemer L, Litz BT, Orsillo SM, Ehlich PJ, Friedman MJ. Increases in retrospective accounts of war-zone exposure over time: the role of PTSD symptoms severity. *J Trauma Stress* 1998;11:597-605.
- 11 Kozarić-Kovačić D, Kocijan-Hercigonja D, Jambrošić A. Psychiatric help to psychotraumatised persons during and after war in Croatia. *Croat Med J* 2002;43:221-8.
- 12 Fontana A, Rosenheck R. A causal model of the etiology of war-related PTSD. *J Trauma Stress* 1993;6:475-500.
- 13 Toole MJ, Waldman RJ. The public health aspects of complex emergencies and refugees situations. *Annu Rev Public Health* 1997;18:283-312.
- 14 Richter D. Croatian experience on the care for the displaced and refugee children. *Croat Med J* 1994;35:8-11.
- 15 Tocilj Šimunković G, Urlić I. War trauma: emotional responses and psychological defenses of displaced persons. *Croat Med J* 1995;36:253-61.

- 16 Kujundžić M, Kern J, Ivanković D, Budak A, Dragun D, Vuletić S. Person displacement pattern in Croatia. *Croat Med J* 1992;33 War suppl 1:55-60.
- 17 Havelka M, Despot Lučanin J, Lučanin D. Psychological reactions to war stressors among elderly displaced persons in Croatia. *Croat Med J* 1995;36:262-5.
- 18 Marić Lj, Car T, Betica-Radić Lj, Radonić M. Mental health status, psychosocial symptoms and migration tendencies of displaced persons in Dubrovnik during 1991/92 siege. *Croat Med J* 1994;35:100-4.
- 19 Government of the Republic of Croatia. War damage in the Republic of Croatia. *Croatian Government Bulletin* 1999. Available from: <http://www.vlada.hr/bulletin/1999/sep-oct/documents.html>. Accessed: March 5, 2002.
- 20 Živić D. Izravni demografski gubitci (ratne žrtve) Hrvatske (1990.-1998.) uzrokovani velikosrpskom agresijom i neke njihove posljedice. *Društvena istraživanja* 2001;10:451-84.
- 21 Šterc S, Pokos N. Demografski uzroci i posljedice rata protiv Hrvatske. *Društvena istraživanja* 1993;2:305-33.
- 22 Živić D. Promjene u dinamici i razmještaju prognaničko-izbjegličkog kontingenta u Republici Hrvatskoj od sredine 1991. do sredine 1998. godine. *Društvena istraživanja* 1999;8:767-91.
- 23 World Health Organization. Terminology of the World Health Report 2000: health systems: improving performance. Available from: www.who.int/terminology/terminology/terminology.html. Accessed: May 23, 2002.
- 24 Shah S, Sesti AM, Chopra T, McLaughlin-Miley C, Copley-Merriman K. Quality of Life terminology documented in package inserts. *Quality of Life Newsletter* 2001;(27):1-3.
- 25 Ware JE Jr, Gandek B. Overview of the SF-36 health survey and the International Quality of Life Assessment (IQOLA) Project. *J Clin Epidemiol* 1998;51:903-12.
- 26 Buttanshaw C, editor. Tipping the balance towards primary healthcare network. Proceedings of the 10th anniversary conference of the Tipping the Balance towards Primary Healthcare Network; 1997 Nov 13-16; Göteborg, Sweden. Göteborg: The Nordic School of Public Health; 1999.
- 27 Jureša V, Ivanković D, Vuletić G, Babić-Banaszak A, Srček I, Mastilica M, et al. The Croatian Health Survey – SF-36: I. General Quality of Life Assessment. *Coll Antropol* 2000;24:69-78.
- 28 Kajević M, Klain E. Psychological reactions in the large group of medical personnel in a psychiatric hospital near the war zone. *Croat Med J* 1995;36:120-5.
- 29 Heslin JM, Soveri PJ, Winoy JB, Lyons RA, Buttanshaw AC, Kovačić L, et al. Health status and service utilization of older people in different European countries. *Scand J Prim Health Care* 2001;19:218-22.

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