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## Mental Health and Health-related Quality of Life in Croatian Island Population

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**Aim** To explore differences in self-perceived health as an indicator of health status and mortality, in six isolated populations from Croatian islands and to compare the results with control from general Croatian population obtained through the National Health Survey.

**Method** Health-related quality of life was measured using the Short Form Health Status Questionnaire (SF-36). The questionnaire was administered to 600 participants, inhabitants of 6 villages: Rab, Barbat, Lopar, and Supetarska Draga on island Rab, and Komiza and Vis, on island Vis, and to control group of 600 participants from the general Croatian population matched by age and gender to islanders.

**Results** The islanders scored higher than controls on 3 out of 8 health dimensions, physical functioning ( $80.1 \pm 22.4$  vs  $73.2 \pm 24.8$ ,  $P < 0.001$ ), vitality ( $61.0 \pm 20.3$  vs  $55.7 \pm 19.9$ ,  $P < 0.001$ ), and pain ( $70.1 \pm 28.0$  vs  $65.9 \pm 26.5$ ,  $P = 0.008$ ). Social functioning of islanders was significantly lower than in control group ( $73.4 \pm 18.6$  vs  $77.6 \pm 23.4$ ,  $P = 0.001$ ). There was also a significant variation in health status among the islanders according to the isolation level, with the largest differences in general health perception and mental health. High isolation group reported the lowest score of all groups on mental health ( $P = 0.018$ ), physical functioning ( $P = 0.045$ ), general health ( $P = 0.001$ ), and vitality dimension ( $P = 0.027$ ).

**Conclusion** Inhabitants of Croatian islands in general showed better health-related functioning on the most of the health dimensions than general population. Islanders scored lower than controls only on social functioning which can be explained by their geographical isolation and small population. Low mental health score of islanders in the highly isolated group should be taken in account in planning health services for islands.

Research dealing with environmental and cultural issues has mainly been focused on urban life. Little attention has so far been paid to the quality of life parameters on remote or geographically isolated areas such as islands, where lifestyle is affected mostly by geographical conditions.

There are two important characteristics of the lifestyle in remote islands or geographically isolated communities: a) medical health care is usually insufficient and b) there are few opportunities for personal growth of inhabitants due to limited interaction with new stimuli (1). Geographical environment and social and health needs of the island population require a specific type of health care, the implementation of which demands investment of considerably larger financial resources. On the other hand, islands and isolated areas are places with many positive lifestyle aspects, such as clean and healthy environment (no smoke or noise, proximity to the sea or the mountains), and less hassle and stress in life (easier transportation, more free time, less competition, well known social environment). The inhabitants of Dalmatian islands represent an exceptional example of rare, genetically isolated groups residing in the contemporary Europe (2). The geographical specificity induced development of a number of isolated groups, each exhibiting specific social and health-related phenomenon. As a direct result of isolation, several genetic disorders have emerged (3-7). Isolate island populations provide a valuable resource for health research. They not only allow investigations that improve our understanding of unique and rare genetic disorders, but can also contribute to a better understanding of common diseases that are important contributors to the burden of disease globally. An example is the research in the population of Sardinia, which showed that 12% of the inhabitants carry beta thalassemia-predisposing mutations in the beta globin gene; it was subsequently shown that beta thalassemia carriers have 25% lower plasma low density lipoprotein (LDL) than the non-carriers (8). In con-

trast to various anthropological and genetic analyses, there have been little or no investigations of the health-related quality of life in such populations (9).

Health-related quality of life refers to the personal sense of physical and mental health and the ability to react to factors in the physical and social environments. It is more subjective than life expectancy and therefore is more difficult to measure. A self-administered health status questionnaire gives us subjective assessments of health for both individual persons and entire communities. These measures capture individuals' subjective assessment of their health through examining various health domains, such as physical, psychological and role function. In both clinical and public health settings, subjective perceptions of health have often greater saliency for functioning and survival than do physiologic and clinical assessments. Global assessments, in which a person rates his or her health as "poor," "fair," "good," "very good," or "excellent," can serve as reliable indicators of one's perceived health (10). Subjective measures of health status have been advocated as a useful proxy for objective measures. In some studies the question about global self rated health has been found to be a powerful predictor of the mortality within a targeted population group (11). Since self-perceived health represents an important indicator of health status and morbidity, the aim of this study was to explore differences in self-perceived health in 6 isolated communities on Croatian islands. The results were compared with Croatian data from National Health Survey 2003 (12). According to the characteristics of Croatian island population, it is to be expected that the specificity of isolated populations will be reflected in the self-perceived physical and mental health as well in the indicators of social functioning of individuals.

### **Subjects and Methods**

Assessment of health-related quality of life of islanders was a part of the "1001 Dalmatians" re-

search program. Data collection was performed during 2002 and 2003 by a team of researchers from the Andrija Štampar School of Public Health, Zagreb University School of Medicine, and the Institute for Anthropological Research in Zagreb, Croatia.

The study sample was a random sample of 100 inhabitants from 6 villages (Rab, Banjol, Lopar, Supetarska Draga, Komiza, Vis) located on two Croatian islands (Rab, and Vis). Sampling was based on computerized randomization of the most complete and accessible population registries in each village. A detailed description of the sampling strategy, field research methods, data collection, storage, and compliance to ethical guidelines can be found elsewhere (13). The two islands were chosen because one is in the proximity of the mainland and less isolated (Rab), while the other one is far from the mainland and very isolated (Vis). The settlements were chosen so that: 2 were relatively open to immigrants (Rab and Banjol), 2 showed intermediate level of isolation (Supetarska Draga, Vis), and 2 were extremely isolated (Lopar and Komiza).

Each of the 600 islanders (mean age 55 years, standard deviation 15) were then matched to an appropriate control of the same age and gender. The controls were drafted from the Croatian National Health Survey, which included approximately 10 000 examinees from the whole Croatia. Health-related quality of life measurements used in this survey were described in detail elsewhere (12). Drafting of controls from the large sample was performed in the following way: randomized code numbers were assigned to all examinees from the National Health Survey, and then the entire database was ranked according to these code numbers. The first examinees by rank that matched islanders by age and gender were assigned to the control group. Overall, 1200 participants were included in this study (596 men and 604 women).

Health-related quality of life was measured with the Short Form Health Status Question-

naire (SF-36) (14). The SF-36 was designed for use in clinical practice and research, health policy evaluations, general population surveys, and health status surveys of population groups, subgroups, and individuals. To date, SF-36 has been used to investigate population differences, burden of chronic disease, and the effect of medical treatment on general health status (15,16). The SF-36 includes one multi-item scale that assesses eight health status dimensions: 1) Physical functioning: limitations in physical activities because of health problems; 2) Social functioning: limitations in social activities because of physical or emotional problems; 3) Role physical: limitations in usual role activities because of physical health problems; 4) Pain: bodily pain; 5) Mental health: general mental health (psychological distress and well-being); 6) Role emotional: limitations in usual role activities because of emotional problems; 7) Vitality: feeling of energy and fatigue; and 8) General health: general health perceptions. For each of the eight dimensions item scores were recoded, summed up, and transformed using a scoring algorithm into a scale ranging from 0 (poor health) to 100 percent (excellent health) (14). Interpretation of SF-36 questionnaire was based on the mean scores of the examinees in each population or a subgroup. The scales are independent of each other, which implies that the mean scores cannot be compared across scales. Islanders' health-related quality of life was presented as the mean scores on 8 health status dimensions, and graphically as health profiles. The survey was constructed for self-administration by persons 14 years of age and older. In this research, SF-36 was administered face-to-face by trained interviewers (physicians).

#### **Statistical analysis**

Data were analyzed descriptively and results for SF-36 health status dimensions were presented as means  $\pm$  standard deviations. Independent sample *t* test was used to test the difference between the group of examinees from Croatian islands

and control group. One-way analysis of variance (ANOVA) was used to compare the 3 groups of islanders defined by the isolation level, followed by *post-hoc* Scheffe test and Dunnett C tests (when variance was unequal).  $P < 0.05$  was considered statistically significant. Statistical analysis was performed with Statistical Package for Social Science, version 10.0 for Windows (SPSS Inc., Chicago, IL, USA).

**Results**

In general, islanders scored higher than Croatian general population on 3 of the 8 health status dimensions (Table 1) physical functioning ( $t = 5.044$ ;  $df = 1198$ ;  $P < 0.01$ ), vitality ( $t = 4.542$ ;  $df = 1198$ ;  $P < 0.010$ ), and pain dimension ( $t = 2.665$ ;  $df = 1198$ ;  $P = 0.008$ ). The only dimension where islanders scored lower than the

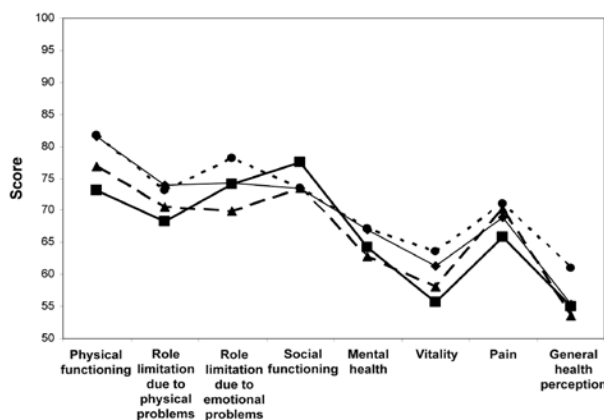
control group was social functioning, where islanders reported significantly lower functioning ( $t = -3.423$ ;  $df = 1198$ ;  $P = 0.001$ ).

In the next step of analysis, 6 island communities were grouped according to the level of isolation in three groups: low isolation (Rab and Banjol), medium (Vis and Supetarska Draga), and high level of isolation (Komiza and Lopar). Health profiles for those three groups were presented in comparison to health profile of control group (Figure 1). High isolation group reported the lowest score of all groups on mental health ( $F = 4.038$ ;  $df = 2, 597$ ;  $P = 0.018$ ), physical functioning ( $F = 3.126$ ;  $df = 2, 579$ ;  $P = 0.045$ ), general health perception ( $F = 6581$ ;  $df = 2, 597$ ;  $P = 0.001$ ), and vitality dimension ( $F = 3.619$ ;  $df = 2597$ ;  $P = 0.027$ ) (Table 2).

**Table 1.** Scores on Short Form Health Status Questionnaire (SF-36) for the people from Croatian islands and controls from general Croatian population

| Health dimension                          | Group (mean ± standard deviation) |             | P*     |
|-------------------------------------------|-----------------------------------|-------------|--------|
|                                           | islanders                         | controls    |        |
| Physical functioning                      | 80.1 ± 22.4                       | 73.2 ± 24.8 | <0.001 |
| Role limitation due to physical problems  | 72.5 ± 40.2                       | 68.3 ± 38.6 | 0.059  |
| Role limitation due to emotional problems | 74.1 ± 40.0                       | 74.1 ± 38.6 | 1.000  |
| Social functioning                        | 73.4 ± 18.6                       | 77.6 ± 23.4 | 0.001  |
| Mental health                             | 65.7 ± 17.7                       | 64.2 ± 18.1 | 0.153  |
| Energy vitality                           | 61.0 ± 20.3                       | 55.7 ± 19.9 | <0.001 |
| Pain                                      | 70.1 ± 28.0                       | 65.9 ± 26.5 | 0.008  |
| General health perception                 | 56.6 ± 21.6                       | 55.0 ± 20.4 | 0.186  |

\*t test.



**Figure 1.** Health status profile for three groups of islanders by isolation level in comparison to control group. Full line – control group; dotted line – low isolated group; dot-dash line – medium isolation group; dashed line – high isolation group.

**Table 2.** Scores on Short Form Health Status Questionnaire (SF-36) for three groups of islanders grouped by the level of isolation

| Health dimension                          | Groups of islanders by isolation (mean ± standard deviation) |             |             | P*    |
|-------------------------------------------|--------------------------------------------------------------|-------------|-------------|-------|
|                                           | low                                                          | medium      | high        |       |
| Physical functioning                      | 81.6 ± 21.5                                                  | 81.6 ± 21.6 | 76.9 ± 23.9 | 0.045 |
| Role limitation due to physical problems  | 74.0 ± 39.5                                                  | 73.1 ± 39.4 | 70.5 ± 41.8 | 0.664 |
| Role limitation due to emotional problems | 74.3 ± 40.6                                                  | 78.2 ± 36.7 | 69.8 ± 42.4 | 0.114 |
| Social functioning                        | 73.4 ± 17.2                                                  | 73.4 ± 19.4 | 73.4 ± 19.1 | 0.999 |
| Mental health                             | 67.0 ± 16.4                                                  | 67.2 ± 18.2 | 62.8 ± 18.2 | 0.018 |
| Energy vitality                           | 61.3 ± 19.9                                                  | 63.6 ± 20.4 | 58.1 ± 20.4 | 0.027 |
| Pain                                      | 68.9 ± 29.0                                                  | 71.1 ± 28.3 | 70.2 ± 26.8 | 0.750 |
| General health perception                 | 55.4 ± 21.3                                                  | 61.0 ± 21.6 | 53.5 ± 21.2 | 0.001 |

\*Analysis of variance.

*Post-hoc* multiple comparisons showed that group with high isolation had significantly lower score on vitality dimension but the difference was significant only in comparison with medium isolation group ( $P = 0.028$ ). In general health dimension, high isolation group (lowest score) and low isolation group were significantly different from medium isolation group (the highest score) ( $P = 0.002$  and  $P = 0.034$ , respectively). On mental health dimension, the group with high isolation had significantly lower score than medium isolation groups ( $P = 0.043$ ) and they differed from low isolation group at the significance level  $P = 0.056$ . Medium and low isolation group were similar in their mental health scores, which was

significantly higher than mental health in the control group ( $P=0.018$ ) (Table 2).

## Discussion

The specific life circumstances in the isolated island populations include geographic isolation within a relatively small area, presumed social isolation of the entire population, scarce health services, and many other limitations in the practical everyday life. Those populations represent an opportunity for investigating the health-related quality of life. It could be expected that the island populations would score lower on health-related quality of life measure in comparison with the mainland population due to the aforementioned factors. However, our results showed that self-reported health of Croatian island populations was better than that of the controls in 3 out of 8 dimensions, ie, physical functioning, vitality, and pain. Regarding physical health, it is possible that in these populations natural selection takes place in a way that individuals with bad health leave the island earlier in life in search of specialized health service. In that way, the physically stronger stay on the island till their old age. On the social functioning dimension, islanders reported lower health than controls from the Croatian general population. This can be explained by their geographical and social isolation. Also, islands have small populations, and often large proportion of older people. Geographically isolated populations are dependent on transportation via air and water, which limits their social functioning, such as meeting new people and getting involved in different social activities. High isolation group reported the lowest score on mental health dimension. This dimension indicates psychological distress and well-being. High score indicates depression and sadness and low score indicates sadness and depression. Low mental health can also be explained by the combination of geographical isolation and small number of inhabitants, mostly older people. Islanders in general reported low-

er social functioning than controls. Low score indicates that their social life suffers due to physical or emotional health. Emotional and psychological problems reported by islanders in the high isolation group can be explained by difficulties in social functioning and not by the physical health, which they assessed as very good. Despite these negative aspects, islanders reported very good health-related quality of life, as can be seen from their scores which were in the upper half of possible range. A study conducted in 1985 among elderly inhabitants of the Adriatic island of Iž also showed high health-related quality of life (17).

A study comparing five middle Dalmatian islands (Brač, Hvar, Korčula, Vis, and Lastovo) with Koprivničko-križevačka County in the northwest continental Croatia regarding the age-standardized incidence rates of gastric, bowel, and pancreatic cancer, showed significantly lower standardized incidence rates of gastric and pancreatic cancer in the island population (18). The explanation was that the “Mediterranean” type of diet could have a protective effect against gastric and pancreatic cancer. Ecologic factors, like favorable climate and type of diet, evidently have a role in the health and in the health-related quality of life. However, the whole spectrum of socio economic life conditions must be kept in mind as an important factor determining magnitude of health conditions. People who live on islands are isolated from the general population on the mainland, but they have stronger connections among themselves. The study on the island of Iž showed that out of 105 participants there was not a single one who was not able to get medical help or drugs when needed. If they were not able to ask for help themselves, their relatives and neighbors did it for them. Results revealed that 28 of the 30 people who lived alone had regular daily conversations with people in the village (17). In contrast to our data, this study showed that people on islands were less socially isolated than, for example, citizens of large cities, often called “alienated.” Much lower everyday stress-

es and life in more familiar surrounding could be the explanation why people on Croatian islands measure their health-related quality of life on many dimensions better than people from the mainland. Nevertheless, low mental health score of islanders in the group with high isolation should be taken in account when planning health services for islands. It was also a good indicator for social policy for the islands.

Comprehensive account of population health status requires both subjective and objective measures, and subjective measures are not a substitute for objective measures, nor do they provide condition-specific information (map to specific disease processes); the subjective measures of health status, such as the global self rated health question and SF-36, do reveal information about the impact on health of chronic diseases and disability that are not reflected in statistics on hospital discharges, primary health care or disability support services.

Beside other documented applications of SF-36, it is a useful tool for better understanding of conditions of life and self perceived health-related quality of life of isolated island populations.

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