Causes and differences in disability prevalence between Croatian counties Krapina-Zagorje and Istria

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Summary

Introduction: A review of the Report on Persons with Disabilities by the Croatian Institute of Public Health identified differences in disability prevalence by county in Croatia. The lowest percentage was observed in Istria (6.4%), whilst the highest in Krapina-Zagorje County (14.4%).

Aim: To determine the potential causes of disability prevalence differences between the previously mentioned counties being as they are geographically close.

Methods: The literature indicates a statistically significant positive association between various causal factors such as socioeconomic indicators, educational attainment, lifestyle habits and disability. After collecting data on these factors, comparisons were made for the two counties in order to determine the possible causal factors for the disability prevalence difference.

Results: The results obtained are in accordance with the hypotheses that Istria has significantly better socioeconomic indicators and level of education compared to Krapina-Zagorje County. However, regarding the differences in individual variables such as lifestyle habits, a $\chi 2$ test was performed, which showed that there was no statistically significant difference between counties.

Conclusion: The results of this study will be used to create policies targeting vulnerable groups.

Keywords: disability, education, socioeconomic indicators, lifestyle habits, counties

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Introduction

Disability poses a large global public health issue and a challenge for all fields to continually improve policies for this particularly vulnerable population. Disability is used as a collective term for various types of impairment, reduced activity and restricted participation in everyday life, furthermore, it reflects how a person's health problems interact with other personal and environmental factors[1].

The main requirement for planning appropriate preventive measures and adopting programs for persons with disabilities is having access to all the data on disability. The importance of data collection is emphasized in the Convention on the Rights of Persons with Disabilities according to which signatory States are obliged to collect relevant information, including statistical data, in order to formulate and implement effective policies[2]. It is important to note that not all countries have ratified this Convention as of yet, therefore there is a lack of a unified definition of disability, which significantly limits the development of disability epidemiology and international data comparison.

An estimated 15% of the world's population experience some type of disability, and according to the Croatian Register of Persons with Disabilities, the above-mentioned population accounts for 12,1% of the general population of Croatia[3,4].

After reviewing the Report on persons with disabilities in Croatia, differences in the disability prevalence by county have been noted (Table 1.)[5]. The range of disability prevalence is between 6.4% do 14.4%. The lowest

Table 1. Overview of the proportion of persons with disabilities in the overall population by county and age group

County of residence	Prevalence of disability (%)	Prevalence of disability in the age group 0-19 (%)	Prevalence of disability in the age group 20-64 (%)	Prevalence of disability in the age group 65+ (%)
KRAPINA-ZAGORJE	14.4	5.3	11	37.3
ŠIBENIK-KNIN	13.3	3.5	10.5	29.9
SPLIT-DALMATIA	12.7	4.3	10.2	33.3
POŽEGA-SLAVONIA	11.9	3.2	10.5	28.1
BJELOVAR-BILOGORA	11.8	5.0	8.8	29.6
VIROVITICA-PODRAVINA	11.7	2.7	10.5	27.4
KARLOVAC	11.6	2.3	8.9	27.5
CITY OF ZAGREB	11.4	5.9	7.9	30.6
LIKA-SENJ	11.2	3.3	9.8	20.7
SISAK-MOSLAVINA	11.2	3.9	9.1	25.3
VARAŽDIN	10.8	3.8	7.8	30.5
BROD-POSAVINA	10.8	3.5	9.9	23.8
OSIJEK-BARANJA	10.5	4.0	9.2	23.7
VUKOVAR-SRIJEM	10.5	3.5	9.6	23.3
KOPRIVNICA-KRIŽEVCI	10	6.8	7.8	20.8
ZAGREB COUNTY	9.5	4.3	7.5	24.1
DUBROVNIK-NERETVA	9	3.3	7.9	20
ZADAR	8.9	2.4	7.5	21.2
MEĐIMURJE	8.7	6.7	6.5	20.8
PRIMORJE-GORSKI KOTAR	8.1	3.9	5.0	22.3
ISTRIA	6.4	3.5	4.8	14.9
Croatia	11.9	4.4	9.3	30.3

prevalence was recorded in the County of Istria, whilst the highest in Krapina-Zagorje County.

Given that these two counties are geographically very close, the bordering areas being only 150 km distance from one another, it is important to mention the need for improvement regarding disability policies and identification of the potential causes of such difference in prevalence.

The literature thus far provides strong empirical confirmation of theoretical arguments concerning the positive correlation between disability and socioeconomic indicators, such as economic indicators (for example income, assets and consumption) and employment status[3,6,7-12].

The correlation between disability and economic indicators has been observed in all types of disability/impairment, and the strength of their correlation increases with the increase in poverty/disability severity[3]. Circumstances surrounding low economic indicators like difficult access to healthcare, inadequate sanitary conditions, malnutrition and generally poor living conditions increase the risk of disability[13]. Research has shown that disability/impairment is significantly more frequent amongst the unemployed in comparison to employed people, as well as that persons with disabilities are more often unemployed compared to those without disabilities.

In addition, reviewing scientific and scholarly literature a link between the degree of disability and education level, as one of the most important socioeconomic indicators of health and mortality, has been observed[7,11,12,14-18]. The level of education is achieved at an early age in life and for most people stays relatively constant throughout their lives, and it affects health in many ways, such as lifestyle, health-related behavior, problem-solving abilities, social relationships, self-esteem and the ability to cope with stress, in ways that, regarding health are beneficial for highly educated people.

Some studies have shown that the disability prevalence is also connected to lifestyle and habits[19]. Some of the lifestyle determinants that can affect health are diet and body mass index, physical activity, sleep, sexual behavior, addiction, drug abuse, use of modern technologies, recreation and learning. Bad habits such as a lack of physical activity and smoking are the most important related risk factors for mortality and morbidity. Recent studies have shown that people who combine several healthy habits, for example, exercise often, don't smoke and maintain a healthy diet, are at lower risk of suffering from chronic diseases including myocardial infarction, stroke, diabetes and cancer, what's more, their healthy life expectancy is longer[20-23].

The aim of this research is to determine the causes of the disability prevalence difference between two regions of Croatia (Istria County and Krapina-Zagorje County) and the following hypotheses were formulated:

- H1. There is a statistically significant difference between counties in socioeconomic indicators (gross domestic product and employment status), with the assumption that the County of Istria has significantly better socioeconomic indicators than the Krapina-Zagorje County.
- H2. There is a statistically significant difference between counties in terms of education, with the assumption that the County of Istria has a considerably higher level of education than the Krapina-Zagorje County.
- H3. There is a statistically significant difference between counties in terms of lifestyle and habits, with the assumption that the County of Istria has a healthier lifestyle and better habits than the Krapina-Zagorje County.

The results of the study can be used in planning and developing policy strategies targeting vulnerable groups[24].

Methods

Information on the type of physical and/or mental impairment according to the Law shall be transferred to the Croatian Register of Persons with Disabilities by a primary care physician, a specialist in school medicine, other medical specialists who have examined and/or treated a disabled person, the competent authorities, state administration and the Croatian Pension Insurance Institute. The data above is processed and published as a statistical summary through annual reports on persons with disabilities.

Reviewing the Report on Persons with Disabilities differences in disability prevalence have been established for each County[5]. The disability prevalence ranges from 6.4% to 14.4%. The lowest percentage was observed in Istria County, whilst the highest in Krapina-Zagorje County.

The aforementioned Report on Persons with Disabilities also contains general socio-demographic parameters and data on the types of impairment for the Republic of Croatia and for each county separately. All data processing from this report was done with information available on the 14th of March 2017, and for the prevalence calculation in Croatia and by county we used data from the Register of Persons with Disabilities combined with the latest official results of the 2011 Census.

By reviewing various statistical reports data was collected in regard to socioeconomic indicators (gross domestic product and employment status), level of education and life habits for the Krapina-Zagorje and Istrian counties, and then compared to determine the possible causality factors for the difference in disability prevalence between the aforementioned counties[25-28].

Results

Socio-demographic characteristics of Istria County and Krapina-Zagorje County

Population

The County of Istria is located in the western part of the Republic of Croatia; it belongs to the Adriatic area of Croatia and includes 10 cities and 30 municipalities. The average population density is 73 people per km^2, according to the official statistical data and population estimates on the 31st of December 2017, 208,323 inhabitants live in the territory of Istria County, which makes up 5.07% of the population of the Republic of Croatia[27].

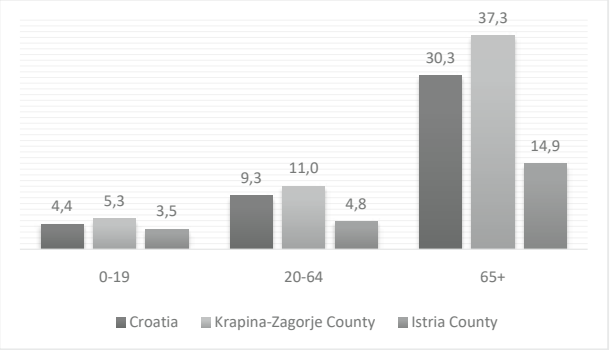
As stated in the Report on Persons with Disabilities in the Republic of Croatia, there are 13,243 persons with disabilities living in the Istria County from which 7,796 people of male gender (59%) and 5,447 persons of female gender (41%) thus making persons with disabilities 6.4% of the population of this County[5]. The majority of people with disabilities, 6,329 (48%) of them, are of working age. It can be observed that disability is present in all age groups, and is also present in childhood making up 10% of the youth population (0-19 years).

If we consider the share of persons with disabilities in the total population of the county, according to the mentioned age groups, we find that the County of Istria has the lowest share of persons with disabilities in the total population of the county, compared to other counties, and that it is below the prevalence average in all age specified categories (Graph 1).

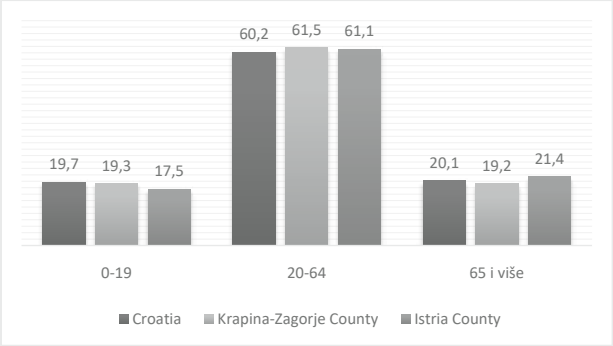
Krapina-Zagorje County is located in the northwestern part of the Republic of Croatia; it belongs to the territory of central Croatia and includes 7 cities and 25 municipalities. It is one of the smaller counties (1,224.22 km^2), but it has a larger demographic significance because of its population density of 108 inhabitants/km^2 making it one of the most densely populated areas, according to the official statistical data and population estimates on the 31st of December 2017, 125,849 inhabitants live in the territory of Krapina-Zagorje, which makes 3.06% of the population of the Republic of Croatia[29].

The same source states that 19,171 persons with disabilities live in the County of Krapina-Zagorje, from which 10,620 are of male gender (55%) and 8,551 are of female gender (45%), thus making people who suffer from disability 14.4% of the county's population. The majority of persons with disabilities, 8,976 of them (47%), are of working age. It can be observed that disability is present in all age groups, and is also present in childhood making up 8% of the youth population (0-19 years).

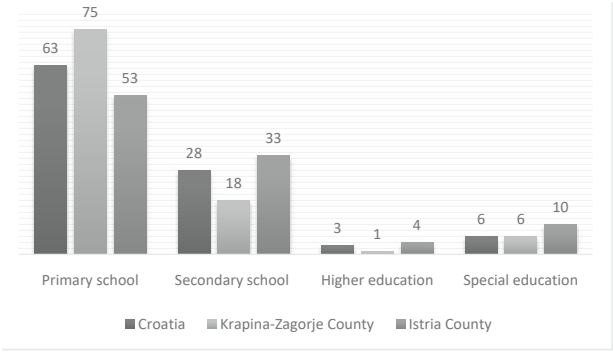
Considering the share of persons with disabilities in the overall county population, in accordance with the age groups, we find that Krapina-Zagorje County has the highest disability prevalence in Croatia. The prevalence for all age groups is above the national average. (Graph 1).



Graph 1. **Prevalence differences by age group**



Graph 2. **Population share by age group in regards to the overall population**



Graph 3. **Differences in education level by county**

In the Graph below (Graph 2) we can see that there is no difference in the share of population by age groups in relation to the population in the cited counties, which leads to the conclusion that the difference in the prevalence of disability is not related to the age of the population.

Education and household status

Based on the currently available information on education, approximately 53% of persons with disabilities/ impairments in the County of Istria haven't completed primary school or have only primary education, 33% have secondary education, while 4% have completed a higher level of education (Graph 3.)[5]. Special education has been completed by 10% of persons with disabilities.

When it comes to housing, the majority of disabled persons (83%) are family householders, approximately 15% are living alone, 0.2% with a guardian or in foster care, whilst 72 persons are living in institutions. An estimated 11% of people with disabilities are living in poor and inadequate housing conditions.

In Krapina-Zagorje County, 75% of persons with disabilities haven't acquired a primary level of education or have just finished obligatory primary school, 18% have a secondary education level and around 1% have a higher education level (Graph 3). Special education can be found in 6% of people with disabilities.

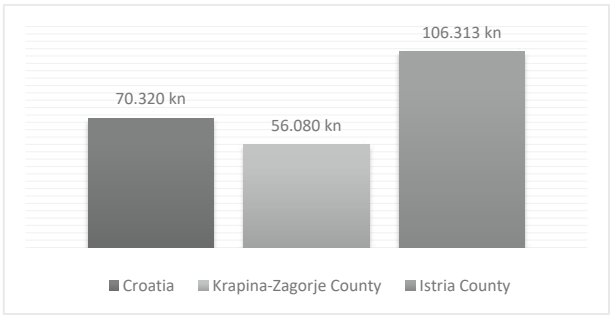
Persons with disabilities in the Krapina-Zagorje County mostly live with their relatives in family households (78%), 18% of them live alone, 0.5% with guardians or in foster care, whilst 185 persons with disabilities are living in institutions. Approximately 13% of persons with disabilities live in inadequate and poor living conditions.

Analysis of the causality factors of the disability prevalence difference between counties

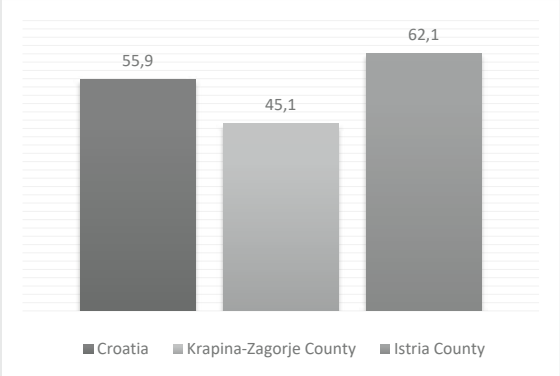
Socioeconomic indicators

For the purposes of this paper, gross domestic product and employment status were analyzed from socioeconomic indicators. According to a report by the Central Bureau of Statistics, gross domestic product, as one of the main macroeconomic indicators, in the Republic of Croatia for the year 2016 was 351,3 billion kunas, with a mean of 70,320 per county (Graph 4)[30]. Furthermore, the gross domestic product of the Istrian County was 106,313 Kunakunas, and of the Krapina-Zagorje county was 56,080 kunas.

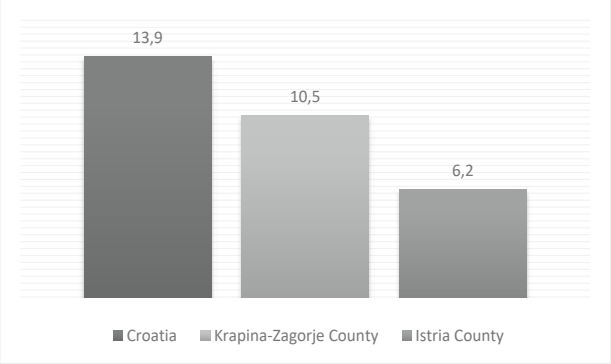
The share of employed people in the general working-age population (20-64 years of age) in Croatia was 55.9%. Calculating the share of employed people in the working-age population by county specifically, we noticed a difference in the county of Krapina- Zagorje where there are 34,915 employed people from a total of



Graph 4. **Gross domestic product differences per capita**



Graph 5. **Differences in the share of employed persons in the working-age population (20-64 years of age)**



Graph 6. **Differences in registered unemployment rate**

77,426 people between the ages of 20 and 64 (45.1%), while in the county of Istria there are 79,038 employed people from a total of 127,300 people in the previously mentioned age group (62.1%) (Graph 5.).

The registered unemployment rate for the Republic of Croatia is 13.9%. Comparing the two counties, the Krapina-Zagorje county has a reported rate of 10.5%, whilst the county of Istria has 6.2% (Graph 6.).

The obtained results are in accordance with the hypothesis that differences in socioeconomic indicators between the mentioned counties exist. Furthermore, the assumption that the county of Istria has significantly better socioeconomic indicators such as the gross domestic product and employment status than the Krapina-Zagorje County was confirmed.

Education level

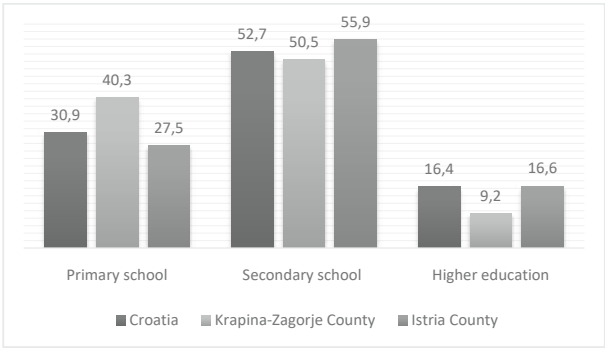
According to a report by the Central Bureau of Statistics, higher education (attained education) means the type of school whose completion has resulted in the highest level of education[26]. Noting that, for the purpose of this paper, the category of primary school education included all of the following persons: those who haven't finished any type of primary school, those who have completed 1-3 grade of primary school, those who have completed 4-7 grade of primary school and those who have completed primary school.

It can be observed in the above Graph 7 that there are differences in the highest attained education by county. Thus, in the County of Istria, 55.9% of the population has completed secondary education and 16.6% have higher education, which is above the national average. Meanwhile, data for the Krapina-Zagorje County shows that its population is below the national average concerning the level of education, that is, 50.5% of people have secondary education, and only 9.2% have a high degree of education.

The obtained results are in accordance with the second hypothesis that there are differences in the level of education between the mentioned counties. The assumption was made that the County of Istria has a significantly better level of education compared to the County of Krapina-Zagorje, and thus confirmed.

Lifestyle and habits

In order to analyze lifestyle and habits, we used the source of representative data for the whole of the Republic of Croatia, i.e. the Croatian Health Survey, which is conducted periodically aiming to collect representative and verified data regarding the adult Croatian population on the frequency of health risk factors (unhealthy



Graph 7. **Differences in the level of education**

diet, excessive alcohol consumption, smoking and lack of physical activity)[31]. The survey was conducted in 2003 with a sample of 9,070 respondents, representing 98% of the adult population of the Republic of Croatia, with a re-survey of respondents in 2008 via a nearly identical questionnaire. Data from 2008 was used for this research.

In order to answer our third and final research problem, which is the existence of differences in variables concerning lifestyle and habits, a χ^2 test was conducted between the counties of Istria and Krapina-Zagorje (Table 2.), which showed no statistically significant difference in alcohol consumption (χ^2=1.90, df=2, p=0.387) and smoking (χ^2=2.04, df=2, p=0.361) between the two counties. The obtained results were not expected, i.e., not in accordance with the assumption that there will be significant differences in the above-mentioned variables between counties.

Furthermore, the results showed that there was a statistically significant difference in diet (χ^2=8.49, df=2, p=0.014) and physical activity (χ^2=11.1, df=2, p=0.004) between counties. However, the difference obtained is not in line with the expectation, i.e. with the assumption that the County of Istria has significantly better life habits compared to the County of Krapina-Zagorje, since the results showed that in the County of Istria there is a higher percentage of risky behavior regarding these variables.

Discussion

The Republic of Croatia is a country of marked geographical, socioeconomic and cultural regional diversity. Each of these regions is characterized by different cultural habits as well as the complexity of lifestyle patterns, creating a unique blend within one country[32]. These aspects of diversity have an impact on health and consequently on the prevalence of disability[3,6-12,14,16-18,31].

Thus, a review of county disability prevalence distributions revealed a difference between counties, ranging from 6.4% in the County of Istria to 14.4% in the County of Krapina-Zagorje. These counties belong to different regions, the County of Istria to the coastal part, and Krapina-Zagorje County to the continental part of Croatia, which supports the claim of the effect that different aspects of diversity mentioned above have.

An individual analysis of the aspects of diversity between counties, i.e., causality factors of disability prevalence, yielded data, most of which pointed in the expected direction that the County of Istria will have significantly more favorable results than the County of Krapina-Zagorje.

From the results obtained in the master's thesis Ivanić, it can be concluded that the data is in accordance with the expectation that there are differences in socioeconomic indicators between counties, more specifically, that the County of Istria has significantly better socioeconomic indicators, such as gross domestic product and employment status, compared to the County of Krapina-Zagorje[24].

The results are consistent with the theoretical arguments of a positive correlation between disability and socioeconomic indicators, such as economic indicators and employment status[3,6-12]. The International Classification of Functioning, Disability and Health promotes the bio-psycho-social model of the definition of disability[1]. Disability is a result of the interaction between health conditions and contextual factors including the environment, that is, socioeconomic conditions as part of these and personal factors also. Conditions linked

Table 2. **Percentage of population with risky behavior in each category of lifestyle habits**

Variables (risky behavior)	Croatia	Istria County	Krapina-Zagorje County
Smoking	18.47%	20.50%	13.90%
Physical activity	37.67%	38.40%	24.50%
Alcohol consumption	7.48%	6.90%	7.90%
Diet	2.03%	10.80%	4.50%

to low economic indicators such as lack of access to health care, inadequate sanitation, malnutrition and poor living conditions increase the risk of disability[3,13]. Research has shown that disability is much more common among the unemployed than in employed groups, and that people with disabilities are significantly more likely to be unemployed compared to people without disabilities[3].

Education determines health benefits because it promotes access to information, lifestyle changes, healthy habits, and requests for health services, and research to date has shown a positive link between education and a lower rate of disability[7,11,12,14-18]. Confirmation of the research hypothesis on the existence of differences in the level of education between the aforementioned counties, i.e., the assumption that the County of Istria compared to the Krapina-Zagorje County has a significantly better level of education is in accordance with previous research on the topic.

On the other hand, this research did not confirm the assumption that there are differences in individual variables concerning lifestyle and habits between Istria and Krapina-Zagorje County. No statistically significant difference was found in alcohol consumption and smoking between the two counties. The source of the data was the Croatian Health Survey conducted in 2008[31]. The results showed that there was a statistically significant difference in diet and physical activity, however, the obtained difference was not in line with expectations, as the results showed that in the County of Istria there is a higher percentage of risky behavior when it comes to these variables. A possible reason for these results lies in the fact that the data on habits, in the said survey, was collected based on the self-assessment of the interviewed person, which opens up the possibility of certain statements not being in accordance with the true state of affairs, especially for questions that are personal, which most habits are[33-35]. With regard to this assumption, further analyses will need to be made in the near future based on the results of the European Health Survey, which will be conducted in 2020, and then will finally reject or confirm the research hypothesis.

Conclusion

Persons with disabilities represent an extremely vulnerable part of the population, which requires continuous social care and the promotion of policies that will enable them to improve their quality of life and have equal opportunities. The results of this study confirm that there is a connection between the prevalence of disability and the level of education. The results from this study and the insight gained are extremely important for the creation of educational policies on the national and county levels, which will improve the educational status of persons with disabilities, as well as the entire population, and encourage them to continue their education, given that there is evidence in this research that the level of education can be a protective factor for disability. The importance of education and training is particularly emphasized in the Convention on the Rights of Persons with Disabilities, signed by Croatia. Signatory states pledge to ensure the inclusiveness of persons with disabilities in the education system, as well as lifelong education, which aims at the full development of human resources and a sense of dignity and self-worth and the effective participation of persons with disabilities in a free society. Improving the educational status of persons with disabilities also opens up greater competitiveness in the labor market and the possibility of easier employment, which, according to the results of this research, is also a protective factor for the development of disability. Krapina-Zagorje and Istria are counties that recognize the importance of continuously improving policies for people with disabilities and for whom the findings of this research on the protective effects of education and socioeconomic factors on disability development will certainly be of great importance in the selection of priority areas[36-37].

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Uzroci i razlike u prevalenciji invaliditeta između Krapinsko-zagorske i Istarske županije

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Sažetak

Uvod: Pregledom Izvješća o osobama s invaliditetom Hrvatskog zavoda za javno zdravstvo utvrđene su razlike u prevalenciji invaliditeta za hrvatske županije. Najmanji postotak uočen je u Istarskoj (6,4 %), a najveći u Krapinsko-zagorskoj županiji (14,4 %).

Cilj: Utvrditi moguće uzroke razlika u prevalenciji invaliditeta između navedenih županija koje su geografski blizu.

Metode: Literatura indicira statistički značajnu pozitivnu povezanost između različitih faktora uzročnosti poput socioekonomskih pokazatelja, razine obrazovanja te životnih navika i invaliditeta. Nakon prikupljanja podataka o navedenim faktorima za Krapinsko-zagorsku i Istarsku županiju, izvršena je usporedba kako bi se utvrdili mogući faktori uzročnosti razlike u prevalenciji invaliditeta.

Rezultati: Dobiveni rezultati u skladu su s hipotezom da Istarska županija u odnosu na Krapinsko-zagorsku ima znatno bolje socioekonomske pokazatelje. Također je potvrđena pretpostavka da Istarska županija u odnosu na Krapinsko-zagorsku ima znatno bolju razinu obrazovanja. U svrhu odgovora na problem postojanja razlika u pojedinim varijablama životnih navika proveden je hi-kvadrat test, koji je pokazao da nema statistički značajne razlike u životnim navikama između županija.

Zaključak: Rezultati će se upotrebljavati za kreiranje politika usmjerenih prema vulnerabilnim skupinama.

Ključne riječi: invaliditet, obrazovanje, socioekonomski pokazatelji, životne navike, županije

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