THE USE OF DIFFERENT TOBACCO AND RELATED PRODUCTS, WITH AND WITHOUT FLAVOURS, AMONG 15-YEAR-OLDS IN SLOVENIA

UPORABA RAZLIČNIH TOBAČNIH IN S TOBAKOM POVEZANIH IZDELKOV Z OKUSOM ALI BREZ NJEGA MED PETNAJSTLETNIKI V SLOVENIJI

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ABSTRACT

Keywords:
smoking, tobacco, adolescents

Background. Different tobacco and related products, like waterpipe, e-cigarettes, are gaining popularity among adolescents in different countries; the data for Slovenia is currently limited. The purpose of this paper is to present the latest data on the use of different tobacco and related products, with or without flavours, among 15-year old students in Slovenia.

Methods. Data for 15-year-old students were drawn from 2014 Slovene database of the cross-national survey Health Behaviour in School-Aged Children. The survey sample was selected with stratified two-stage sampling method. The survey was performed in schools with a self-administered web questionnaire. The survey questionnaire included international compulsory, selected optional and national questions, all on a variety of topics related to youth health behaviour.

Results. 25.2% of 15-year-old students reported current (past 30-day) use of any tobacco related product, mainly cigarettes (93.1% of users), followed by waterpipe (11.7%) and cigars, cigarillos and pipes (9.4%). Exclusive use of unconventional products is low (5.1% of users). 85.5% of users of any product used one product, 48.5% of users used products with flavours. The use of different products, one or more products, and flavoured products was related to gender.

Conclusion. A comprehensive tobacco control and prevention must address all tobacco and related products.

IZVLEČEK

Ključne besede:
kajenje, tobak, adolescenti

***Uvod**. Med mladostniki v tujini postajajo vedno bolj popularni različni tobačni in s tobakom povezani izdelki, kot so vodne pipe ali elektronske cigarete, za Slovenijo pa imamo o tem na voljo omejene podatke. Namen prispevka je prikaz najnovejših podatkov o uporabi tobačnih in s tobakom povezanih izdelkov z okusom ali brez njega med všolanimi petnajstletniki v Sloveniji.*

***Metode**. Uporabili smo podatke za všolane petnajstletnike iz slovenske podatkovne baze presečne raziskave Z zdravjem povezana vedenja v šolskem obdobju 2014. Za oblikovanje vzorca je bilo uporabljeno dvostopenjsko stratificirano vzorčenje. Anketiranje je potekalo v šolah s pomočjo spletne ankete. Vprašalnik obsega niz mednarodnih obveznih in opcijskih vprašanj ter nekaj nacionalnih vprašanj o različnih področjih z zdravjem povezanih vedenj mladostnikov.*

***Rezultati**. O uporabi vsaj enega tobačnega ali s tobakom povezanega izdelka v zadnjih 30 dneh je poročalo 25,2% všolanih petnajstletnikov, največ o uporabi cigaret (93,1% uporabnikov), vodnih pip (11,7%) ter cigar, cigarilosov in pip (9,4%). Izključna uporaba nekonvencionalnih izdelkov je nizka (5,1% uporabnikov). 85,5% uporabnikov kateregakoli izdelka je uporabljalo en izdelek, 48,5% izdelke z dodanimi okusi. Uporaba različnih tobačnih in s tobakom povezanih izdelkov, enega ali več izdelkov in izdelkov z dodanimi okusi se je razlikovala med spoloma.*

***Zaključek**. Celovit program nadzora nad tobakom in preprečevanje rabe tobaka morata vključevati vse različne tobačne in s tobakom povezane izdelke.*

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1 INTRODUCTION

Tobacco use is the leading preventable cause of death in Slovenia (1), and one of the leading risk factors in terms of attributable DALYs (2). Smoking is initiated mainly by adolescents; 84.7% of ever smokers in Slovenia, aged 35-44, first smoked at 19 years of age or less (3). Although data on adolescent prevalence and trends of tobacco use in Slovenia is available (4-6), much less is known about adolescents' use of different types of tobacco and related products. Different patterns and trends of use are present in different countries; in some the situation changed extensively in only a few years, which shows the importance of a regular surveillance of the use of these products (7, 8). In the United States of America (the USA), adolescents' use of electronic cigarettes (e-cigarettes) and waterpipe surpassed cigarette use. In 2014, those aged 14-18 mostly used e-cigarettes (13.4%) and waterpipe (9.4%), followed by cigarettes (9.2%) and cigars (8.2%). E-cigarette use tripled and waterpipe use almost doubled from 2013 to 2014, while the use of cigarettes and cigars equivalently decreased (7). In Canada, where e-cigarettes and liquids with nicotine are not approved for sale, 2.6% of 15-19-year-olds reported current use of e-cigarettes in 2013 (9). In Poland, 29.9% of 15-19-year-olds used e-cigarettes in 2013-2014, the share increased from 5.5% in 2010-2011 (8). In Finland, 2.0% of 12-18-year-olds in 2013 reported the use of e-cigarettes more than 20 times in life (10), while in the United Kingdom, 3.0% of 11-16-year-olds reported at least monthly use of e-cigarettes in 2014 (11). Waterpipe is also gaining popularity among youth (7, 12). Current waterpipe use was reported by 10.2% of 15-year-olds in Sweden in 2011 (13), 34.9% of 15-year-olds in Estonia in 2006 (14), 22.4% of 13-15-year-olds in Czech Republic, and 13.8% of 13-15-year-olds in Slovakia in 2011 (15). Hand-rolled cigarettes are another popular product among youth (16, 17). In Croatia, 13% of 13-15-year-olds smoked hand-rolled cigarettes in 2011, in Slovakia 6.2% in 2011, and in Italy 8.2% in 2010 (15). In Canada in 2008-2009, 24.2% of current smokers, aged 14-18 years, smoked hand-rolled cigarettes (16). Flavours in tobacco and related products increase the appeal of these products to youth (18). In Poland in 2009-2010, 12.3% of 15-19-year-olds used flavoured cigarettes (19). In Canada, 50.0% of 14-18-year-old users of any tobacco product reported the use of products with flavours in 2012/13, and in the USA, 73.0% in 2014 (both countries have already introduced bans on flavours (excluding menthol) in selected tobacco products) (20, 21). Limited data also shows high shares of adolescents reporting current use of more than one tobacco or related product. In the USA in 2014, 51.3% of 14-18-years-old users of any product used more than one product (7).

The latest data on the use of different tobacco and related products among Slovene youth is available from 2011/2012 (15, 17). The most used products in 15-24 age group are manufactured cigarettes, hand-rolled cigarettes and waterpipe (92.7%, 18.0% and 3.9% of current users, respectively) (17). Among 13-15-year-olds, 23.8% used manufactured cigarettes, 10.9% hand-rolled cigarettes, 9.8% waterpipe, 7.9% cigars, mini cigars or cigarillos, and 3.6% chewing tobacco or snus, while the study gives no data on the use of e-cigarettes (15). We found no published data on the use of flavoured products and more than one tobacco and related product among adolescents in Slovenia. The aim of this article is to present the most recent data on the use of different tobacco and related products (with and without flavours), and multiple tobacco and related products among 15-year-old students in Slovenia, and to explore differences in the use of these products by gender, age at smoking initiation, and the frequency of current smoking.

2 METHODS

Data for 15-year-old students were drawn from 2014 Slovene database of the cross-sectional survey Health Behaviour in School-Aged Children, carried out on a nationally representative sample of 11-, 13- and 15-year-old students attending schools. The basis for the sample were the data from the Ministry of education, science and sport about the enrolment and number of classes for the school year 2013/2014. The sample was drawn from the list of all relevant classes. The primary sampling unit was school class; classes were randomly selected. Stratified two-stage sampling was used. At the first stage, primary and secondary schools were selected, and at the second stage, among secondary schools, classes within different school programmes were selected (grammar school, 4-year technical school, middle vocational school and lower vocational school). The survey was performed in schools with a self-administered web questionnaire from 3rd to 14th February 2014. The final response rate (based on selected classes) was 92.7%. The sampling procedure met all international requirements on representativeness, so we did not decide to weight the data, despite minor differences in gender distribution of the sample in comparison to population gender distribution at the beginning of the school year. Survey methodology in detail is available elsewhere (4). The survey questionnaire included international compulsory, selected optional and national questions, all on a variety of topics related to youth health behaviour (questions on different demographic factors, eating habits, weight control and body image, physical activity, sedentary behaviour, risk behaviour, sexual health, violence and injuries, family culture, peer culture, health and wellbeing, school and social inequality), including tobacco and related products use. Questions on the use of different tobacco and related products, flavoured products, the number of cigarettes

smoked in the last 30 days, and age at first cigarette smoking were answered only by 15-year-old students.

The use of different tobacco and related products was assessed by a national question, asking about the use of different products during the last 30 days (manufactured cigarettes, hand-rolled cigarettes, cigarillos, cigars, pipes, smokeless tobacco, e-cigarettes, waterpipe, others). For a part of our analysis, we merged products in two categories, namely conventional (cigarettes, cigarillos, cigars, pipes) and unconventional (smokeless tobacco, e-cigarettes, waterpipe, others) products.

The use of flavoured products was assessed by a national question, asking about the use of products with flavours during the last 30 days (yes, I used only products with flavours; yes, I used products with and without flavours; no; I do not know). The share of those using flavoured products was calculated by combining the first two answers.

The number of cigarettes smoked during the last 30 days was assessed by an optional question (none; less than one a week; less than one a day; 1-5 a day; 6-10 a day; 11-20 a day; more than 20 a day). The age at cigarette smoking initiation (more than one puff) was assessed by a compulsory question (never; 11 or earlier; 12; 13; 14; 15 and 16 years of age or more). Both questions were used or adapted from the European School Survey Project on Alcohol and Other Drugs (ESPAD) survey. The data on current tobacco smoking was acquired by a compulsory question (every day; at least once a week, but not every day; less than once a week; I do not smoke).

To estimate the number of tobacco and related products users among 15-year-old students in Slovenia, we used the data from Statistical office on the number of 15-year-old inhabitants of Slovenia in the first half of 2014 (18.532 15-year-olds).

All analyses were conducted in IBM SPSS 21. We used the Chi-square test (X2) and correlation matrix to examine the association and correlation between selected variables; the significance level used was 0.05. If estimations are of lower accuracy, they are labelled with letters M (standard error of share on interval from 5% to 15%) and should be used with caution.

3 RESULTS

Our final sample comprised of 4.997 11-, 13- and 15-year-old students and was representative of the whole population of 11-, 13- and 15-year-old students in Slovenia. The final response rate was 92.7%. Both genders were equally represented (51.0% female, 49.0% male). In our final sample, 68.3% of all students attended primary, 12.9% grammar, 12.1% technical and 6.7% vocational schools. The sample of 15-year-old students, analysed in this study, consisted of 1.615 pupils, 46.1% male and 53.9% female.

Any tobacco or related product use during the last 30 days was reported by 25.2% of 15-year-old students (Table 1). The use of the majority of different types of tobacco and related products was related to gender.

Table 1. The use of different tobacco and related products during the last 30 days among all 15-year-old students (n=1558) and users of any product (n=392).

	Both genders			Boys			Girls			p (diff. among genders for all 15-year-old students)	Estimated number of users among 15-year-olds of both genders
	n	% among all 15-year-old students*	% among users**	n	% among all 15-year-old male students*	% among users**	n	% among all 15-year-old female students*	% among users**		
any product	392	25.2%	100.0%	182	25.6%	100.0%	210	24.8%	100.0%	0,869	4670
manufactured cigarettes	300	19.3%	76.5%	118	16.6%	64.8%	182	21.5%	86.7%	**0.016**	3577
hand-rolled cigarettes	162	10.4%	41.3%	94	13.2%	51.6%	68	8.0%	32.4%	**0.001**	1927
waterpipe	46	3.0%	11.7%	31	4.4%	17.0%	15	1.8%	7.1%	**0.003**	556
cigarillos, cigars, pipes	37	2.4%	9.4%	25	3.5%	13.7%	12	1.4%	5.7%	**0.007**	445
e-cigarettes	14	0.9%	3.6%	11	1.5%	6.0%	3	0.4%	1.4%	**0.013**	167
smokeless tobacco	11	0.7%	2.8%	8	1.1%	4.4%	3	0.4%	1.4%	0.070	130
other	6	0.4%	1.5%	4	0.6%	2.2%	2	0.2%	1.0%	0.299	74

*the sum of shares for each product exceeds the share of users of any product as one person can use more than one product
**shares for each product together exceed 100% as one person can use more than one product

Regardless of the type, cigarettes were used by 93.1% of all 15-year-old students that used any tobacco or related product, by 87.9% of boys and 93.3% of girls. The number of cigarettes smoked during the last 30 days (Figure 1) was not related to gender (p=0.455).

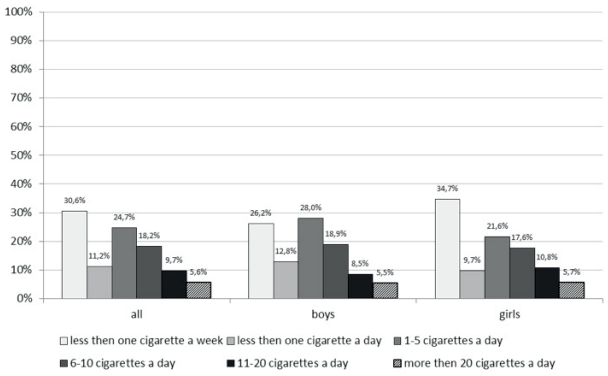

Figure 1. The number of cigarettes smoked during the last 30 days among 15-year-old students who are cigarette smokers (n=340).

Correlation matrix indicates weak negative correlation between the age at smoking initiation and the number of cigarettes smoked during the last 30 days (-0.219, p=0.01). It indicates that the number of cigarettes smoked during the last 30 days decreases by increasing the age at smoking initiation.

Weekly or daily smoking is not related to the type of cigarettes used when comparing those using only manufactured cigarettes with those using hand-rolled cigarettes only or in combination with manufactured cigarettes (weekly smoking: p=0.052; daily smoking: p=0.092).

When considering manufactured and hand-rolled cigarettes as one product, the majority of 15-year-old students that used any tobacco or related product (85.5%) used one product (Table 2); the use was related to gender (p=0.001). The most frequent combinations used were cigarettes with waterpipe or e-cigarette. Only one 15-year-old student used solely e-cigarettes, others used e-cigarettes and other products (12 of 14 e-cigarette users also smoked cigarettes). 15 of 46 waterpipe users used solely waterpipe, others used also other products (29 of 31 waterpipe users also smoked cigarettes).

The use of one or more tobacco and related products is not linked to the frequency of current smoking (Table 3); however, it is associated with the age at smoking initiation (Table 4).

Table 3. The use of one or more tobacco or related products among 15-year-old students who are current smokers by the frequency of smoking tobacco.

	Smoking tobacco weekly or more often		Smoking tobacco less than weekly		p
	n	%	n	%	
All					
one	168	85.3%	74	83.1%	
two or more	29	14.7%	15	16.9%	0.643
Boys					
one	76	77.6%	27	75.0%[M]	
two or more	22	22.4%	9	25.0%[M]	0.756
Girls					
one	92	92.9%	47	88.7%	
two or more	7	7.1%	6	11.3%	0.372

[M]-less precise estimate

Table 2. The use of one or more tobacco and related products during the last 30 days among all 15-year-old students (n=1558) and users of any product (n=392).

	Both genders			Boys			Girls			Estimated number of users among 15-year-olds of both genders
	n	% among all 15-year-old stu-dents*	% among users**	n	% among all 15-year-old male stu-dents*	% among users**	n	% among all 15-year-old female stu-dents*	% among users**	
one	335	21.5%	85.5%	144	20.3%	79.1%	191	22.5%	91.0%	3984
two or more	57	3.7%	14.5%	38	5.4%	20.9%	19	2.2%	9.0%	686

Table 4. The use of one or more tobacco or related products among 15-year-old students who are ever smokers by the age of smoking initiation.

	First smoked cigarettes at 13 or less		First smoked cigarettes at 14 or more		p
	n	%	n	%	
All					
one	114	79.7%	213	89.1%	0.011
two or more	29	20.3%	26	10.9%	
Boys					
one	43	67.2%[M]	95	85.6%	0.004
two or more	21	32.8%[M]	16	14.4%	
Girls					
one	71	89.9%[M]	118	92.2%	0.566
two or more	8	10.1%[M]	10	7.8%	

[M]-less precise estimate

A vast majority of 15-year-old students used conventional products (Table 5) and the use was not related to gender.

48.5% of 15-year-old students that used any product used products with flavours; the use was related to gender (Table 6), but not to the frequency of smoking (Table 7) or age at smoking initiation (Table 8).

Table 5. The use of conventional and unconventional products during the last 30 days among all 15-year-old students (n=1558) and users of any product (n=392).

	Both genders			Boys			Girls			p (diff. among genders for all 15-year-old students)	Estimated number of users among 15-year-olds of both genders
	n	% among all 15-year-old students*	% among users**	n	% among all 15-year-old male students*	% among users**	n	% among all 15-year-old female students*	% among users**		
conventional	372	23.9%	94.9%	167	23.5%	91.8%	205	24.2%	97.6%	0.763	4429
unconventional	66	4.2%	16.8%	44	6.2%	24.2%	22	2.6%	10.5%	<0.001	778
only unconventional	20	1.3%	5.1%	15	2.1%	8.2%	5	0.6%	0.2%	0.008	241

*shares for each group together exceed the share of users as one person can use more products
**shares for each product together exceed 100% as one person can use more products

Table 6. The use of flavoured tobacco and related products during the last 30 days among 15-year-old students and users of any product.

	All		Boys		Girls		p
	n	%	n	%	n	%	
Flavoured products	189	48,5	75	40,3	114	55,9	0,002

Table 7. The use of flavoured tobacco and related products during the last 30 days among 15-year-old students who are current smokers by the frequency of smoking tobacco.

	Smoking tobacco weekly or more often		Smoking tobacco less than weekly		p
	n	%	n	%	
All	84	44.2%	41	50.0%[M]	0.379
Boys	38	40.0%[M]	13	39.4%[M]	0.951
Girls	46	48.4%[M]	28	57.1%[M]	0.321

Table 8. The use of flavoured tobacco and related products during the last 30 days among 15-year-old students who are ever smokers by the age of smoking initiation.

	First smoked cigarettes at 13 or less		First smoked cigarettes at 14 or more		p
	n	%	n	%	
All	61	44.5%	120	50.6%	0.255
Boys	22	36.7%[M]	47	41.2%	0.559
Girls	39	50.6%[M]	73	59.3%	0.228

4 DISCUSSION

In Slovenia, a vast majority of 15-year-old students that are users of any tobacco or related products use cigarettes (mostly manufactured cigarettes, but hand-rolled cigarettes are also used substantially), followed by waterpipe and later by cigars, cigarillos and pipes. A vast majority therefore uses conventional products. Every sixth student uses unconventional products, whilst the exclusive use of unconventional product is low (mainly the exclusive use of waterpipe). There are significant differences in the use of different types of tobacco and related products between genders; girls are more likely to use manufactured cigarettes, while boys are more likely to use hand-rolled cigarettes, waterpipe, cigarillos, cigars and pipes, and e-cigarettes. Almost half of those that use any product – significantly more girls than boys – use products with flavours. Approximately every seventh 15-year-old student who uses any product uses more than one product – significantly more boys than girls and significantly more those that started smoking cigarettes earlier. Most frequent combinations are cigarettes and waterpipe or cigarettes and e-cigarettes.

Only limited comparisons on current use of different tobacco and related products with other studies are possible mainly due to different age groups, the range of monitored products, definitions of use and a limited number of published studies with nationally representative samples. When comparing our results to results of other available studies among youth in Slovenia, we find the same order of mostly used products, while shares differ (15, 17), which is most likely attributable to the difference in age groups of respondents, different year of the survey and methodological differences. The comparison with adult population in Slovenia shows lower shares of the use of manufactured cigarettes among 15-year-old students, while shares of the use of all other tobacco and related products are higher in students. The use of more than one product among adult population is around half of the use of more than one product among 15-year-old students (17). Adolescents are obviously prone to use different and unconventional products and more than one product. There is no data available to compare the use of flavoured products. The comparison of available data for similar age groups in other countries show that shares of the use of waterpipe, e-cigarette and unconventional products in general and more than one product are currently most likely lower in Slovenia (7-15, 22).

The use of any product containing nicotine is problematic in adolescence, which is a sensitive developmental period of enhanced clinical vulnerability to nicotine. Adolescents are more likely than adults to become addicted to nicotine; nicotine acts as a gateway to other substances, affects brain development and has long-term negative consequences on cognition (22, 23). Adolescents that might never use conventional products are using unconventional products (8-11, 14). Those could act as a gateway to conventional tobacco products use by exposing youth to nicotine, and increase the overall number of youth initiating tobacco use. A limited number of longitudinal studies on waterpipe and e-cigarette ever users shows an increased risk of later conventional tobacco use initiation in adolescents (25-27). Flavoured products are tobacco industry's innovation to increase the appeal of smoking in youth. They can promote youth smoking initiation and help young occasional smokers to become daily smokers by reducing or masking the natural harshness and taste of tobacco smoke (18). Young people who start smoking menthol cigarettes are at greater risk of progression to regular smoking and nicotine addiction than those who start smoking non-menthol cigarettes (28). Flavours are also one of the most important reasons for increasing the popularity of waterpipe (12) and e-cigarettes among youth (29). Hand-rolled cigarettes are popular among youth also due to lower prices compared to manufactured cigarettes (30, 31). Some studies indicate that youth using hand-rolled cigarettes are more likely heavier and more frequent smokers (16, 32), more addicted to nicotine and less likely considering quitting smoking, when compared to users of manufactured cigarettes (32). Our study does not show more weekly or more daily smoking among 15-year-old students that use hand-rolled cigarettes compared to those that use only manufactured cigarettes. Studies also indicate increased nicotine addiction in users of more than one product (33). All this underlines the importance of continuous surveillance, timely implementation and strict enforcement of all necessary measures to prevent children and adolescents from using all nicotine containing products, and the inclusion of all different products in prevention and cessation programmes. Products gaining popularity among youth are currently mostly unregulated or inadequately regulated, available to minors and/or more affordable, also in Slovenia. The World Health Organization recommends regulation for waterpipe and e-cigarettes as for any other tobacco product (34, 35).

Our research is the first in Slovenia to give insight into the use of different tobacco and related products, including e-cigarettes, flavoured products and the use of more than one product, on a representative sample of adolescents in schools. Our study has some limitations. The cross-sectional design of the study does not allow for any conclusions on causality or chronology. Under-reporting of smoking and the use of different products is possible. We collected data only from 15-year-olds that attend school and we can generalize data only to the group of 15-year-old students. We did not ask about nicotine content of liquids for e-cigarettes and the use of tobacco (rather than herbal products) for waterpipe. Regardless of limitations, our study offers valuable data for tobacco control and prevention.

5 CONCLUSIONS

15-year-old students in Slovenia currently use mostly conventional products, very often they use products with flavours and mostly they use only one product. However, situation in other countries shows that a pattern of use can change quickly, especially due to non-existent or inadequate regulation of certain products or their characteristics, such as flavours. Regular surveillance, addressing all different products in prevention and cessation programmes, and timely and effective regulation, comparable for all different products, combined with strict enforcement are necessary for effective prevention of the use of all products containing nicotine among youth in Slovenia.

CONFLICT OF INTEREST

The authors declare that no conflict of interest exists.

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ETHICAL APPROVAL

The study was approved by the Republic of Slovenia National Medical Ethics Committee on 29 October 2013 under the number 139/10/13.

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THE DEVELOPMENT OF A CONSENSUS DEFINITION FOR HEALTHCARE IMPROVEMENT SCIENCE (HIS) IN SEVEN EUROPEAN COUNTRIES: A CONSENSUS METHODS APPROACH

OBLIKOVANJE DOGOVORNE DEFINICIJE ZA POJEM ZNANOST O UVAJANJU IZBOLJŠAV V ZDRAVSTVU (HIS) V SEDMIH EVROPSKIH DRŽAVAH: PRISTOP Z METODAMI KONSENZA

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ABSTRACT

Introduction. There is a limited body of research in the field of healthcare improvement science (HIS). Quality improvement and 'change making' should become an intrinsic part of everyone's job, every day in all parts of the healthcare system. The lack of theoretical grounding may partly explain the minimal transfer of health research into health policy.

Methods. This article seeks to present the development of the definition for healthcare improvement science. A consensus method approach was adopted with a two-stage Delphi process, expert panel and consensus group techniques. A total of 18 participants were involved in the expert panel and consensus group, and 153 answers were analysed as a part of the Delphi survey. Participants were researchers, educators and healthcare professionals from Scotland, Slovenia, Spain, Italy, England, Poland, and Romania.

Results. A high level of consensus was achieved for the broad definition in the 2nd Delphi iteration (86%). The final definition was agreed on by the consensus group: 'Healthcare improvement science is the generation of knowledge to cultivate change and deliver person-centred care that is safe, effective, efficient, equitable and timely. It improves patient outcomes, health system performance and population health.'

Conclusions. The process of developing a consensus definition revealed different understandings of healthcare improvement science between the participants. Having a shared consensus definition of healthcare improvement science is an important step forward, bringing about a common understanding in order to advance the professional education and practice of healthcare improvement science.

Keywords:
healthcare, improvements, science, consensus methods, definition, Europe

IZVLEČEK

Uvod. *Skupno število raziskav na področju znanosti o uvajanju izboljšav v zdravstvu (Healthcare Improvement Science - HIS) je majhno. Vendar pa bi morala izboljševanje kakovosti in vpeljava sprememb postati neločljivo povezana z vsakodnevnim delom zdravstvenih delavcev na vseh področjih zdravstvenega sistema. Pomanjkanje teoretičnih izhodišč bi lahko delno pojasnilo nizko stopnjo prenosa rezultatov raziskav v zdravstveno politiko.*

Metode. *Namen članka je predstaviti postopek oblikovanja definicije za pojem znanost o uvajanju izboljšav v zdravstvu. Pri pristopu z metodami konsenza smo uporabili metodo Delfi, izvedeno v dveh krogih, panelne skupine strokovnjakov in tehnike konsenzne skupine. V skupini strokovnjakov in konsenzni skupini je sodelovalo 18 oseb, v okviru metode Delfi smo analizirali 153 odgovorov. Sodelujoče osebe so bile raziskovalci, izobraževalci in zdravstveni delavci iz Škotske, Slovenije, Španije, Italije, Anglije, Poljske in Romunije.*

Rezultati. *V drugem krogu metode Delfi je bila dosežena visoka stopnja konsenza (86-odstotna) za široko definicijo. Konsenzna skupina je oblikovala naslednjo končno definicijo: »Znanost o uvajanju izboljšav omogoča ustvarjanje znanj za izvajanje sprememb ter zagotavljanje v pacienta usmerjene zdravstvene obravnave, ki je varna, zmogljiva, učinkovita, pravična in pravočasna. Izboljšuje pacientove izide zdravstvene obravnave, sistem nudenja zdravstvenih storitev in zdravje populacije.«*

Razprava. *Postopek oblikovanja dogovorne definicije je razkril različno razumevanje pojma znanost o uvajanju izboljšav v zdravstvu med sodelujočimi. Oblikovanje skupne dogovorne definicije je pomemben korak naprej, saj pripomore k splošnemu razumevanju tega pojma in s tem tudi k spodbujanju strokovnega izobraževanja in izvajanju znanosti o uvajanju izboljšav v praksi.*

Ključne besede:
zdravstvo, izboljšave, znanost, metode konsenza, definicija, Evropa

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1 INTRODUCTION

Improving healthcare quality has become a priority over the past years (1). While much of quality improvement work is unscientific (2), the adoption of a more scientific approach to improvement could enhance the ability of health systems to provide high-quality care and use their resources optimally (3). Healthcare improvement science (HIS) represents 'the combined and unceasing efforts of everyone – healthcare professionals, patients and their families, researchers, payers, planners and educators – to make the changes that will lead to better patient outcomes (health), better system performance (care) and better professional development (learning)' (4, p. 2). In this respect, quality improvement and change making should become an essential part of healthcare professionals' work at all levels of the healthcare system (5). Implementation science and quality improvement efforts share the ultimate goal of improving healthcare quality. However, there are differences. Quality begins with a specific problem in a given healthcare system, while implementation science begins with evidence-based practice (EBP) that is not used effectively, then identifies and addresses quality issues at the level of providers, clinics, or the healthcare system (6). Topic reviewers reported a diversity of outcomes used for quality improvement evaluations, flaws in study design, and incomplete reporting (7).

The Health Foundation (8) developed an explanation of what improvement science should be. They defined it as 'building a knowledge base for improving health services and translating this knowledge into practice to deliver the best possible patient care' (8, p. 7). Moreover, it has been stressed that the implementation science community should provide guidelines for reporting the use of theoretical frameworks within implementation studies and their efficacy (9). This is important because few hospital-based interventions are essentially theoretical (10). The Health Foundation definition (8, p. 7) states clearly that improvement science 'requires a systematic, scientifically rigorous approach to close the gap between current and best practice.'

In the case of quality improvement, theory needs development, which draws from a better understanding of practice (11). Many quality improvement practitioners believe that quality improvement is implemented in complex adaptive systems. They sometimes feel limited by research findings that fail to recognize the complexity and the need for adaptation. Quality improvement practitioners could help researchers to see the larger patterns specific to complex systems and draw upon possible solutions (12). Organizational learning framework could be used to explore the factors influencing improvement feasibility (13). Organizations worldwide have adopted interprofessional education and interprofessional collaborative practice in an effort to improve healthcare delivery systems (14), which fits well with the Health Foundation definition (8, p. 7) that 'improvement science embraces disciplines across health services research, from sociology to statistics, psychology to health economics.' The next generation of healthcare professionals will require new skills to make sure that quality improvement in health care is successful (15). For this reason, it is important how different healthcare professionals understand HIS.

1.1 The Aim

The article describes a part of the project 'Improvement Science Training for European Healthcare Workers (ISTEW),' which aimed to develop shared academic and practice-based programmes that would enable European institutions to build improvement capacity within their healthcare workforce. This article discusses a keystone component of the project, namely the development of a consensus definition for HIS, based on the interprofessional and multicultural consensus of healthcare professionals considered as experts from seven European countries.

2 METHODS

2.1 Research Design and Data Collection

Research design comprised of consensus methods, including the nominal group technique, the Delphi process, and the consensus group technique. The aim of consensus methods is to determine the extent to which experts or lay people agree about a given issue. The term 'agreement' takes two forms, which need to be distinguished: firstly, the extent to which each respondent agrees with the issue under consideration (typically rated on a numerical or categorical scale) and, secondly, the extent to which respondents agree with each other (16).

2.1.1 The Nominal Group Technique

The nominal group technique uses a highly structured meeting to gather information from relevant experts (usually 9-12 in number) about a given issue. It consists of two rounds, in which panellists rate, discuss, and then re-rate a series of items or questions (16). The nominal group technique was used twice. First, we implemented two structured Skype meetings with research group members from seven European countries. The goal was to develop a working definition of HIS, to increase consensus amongst participants about the meaning and content of HIS, and to establish the level of development and understanding of HIS in each country. Expert-based knowledge, literature and comprehension across a core group of seven experts was used. After two meetings, a working definition was developed and tested in the Delphi process. Second, the nominal group technique was used on the same team in

order to develop an extended questionnaire for the 2nd Delphi iteration.

2.1.2 The Delphi Process

A Delphi study is a robust method that draws on expert opinions, and compares them with the combined opinions of other participating experts over several rounds, until a consensus on specified criteria is reached (16). A two-iteration Delphi technique was developed with participants from seven European countries. The Delphi technique enabled us to collect data from several domains related to healthcare in education, research, management and practice. Moreover, two questionnaires were designed for each iteration with quantitative and qualitative elements allowing us to achieve a merging of opinions from 87 respondents. The respondents were consulted in two anonymous Delphi rounds. A 5-point Likert scale (1–strongly disagree, 2–disagree, 3–neither agree nor disagree, 4–agree, 5–strongly agree) was used in both questionnaires to rate the importance of each HIS definition element and of the definition as a whole. Respondents could also offer suggestions for improving separate parts of the definition by replying to open-ended questions and providing HIS descriptions used in their countries. Furthermore, we were interested in obtaining some demographic data (the area of work, respondent connection with HIS and involvement in HIS) and data about the description of HIS in their countries. Reliability test results were good. Cronbach's Alpha for statements (N=6) for 1st Delphi iteration was 0.867 and for statements (N=7) for 2nd Delphi iteration 0.843.

Over several rounds, a specific definition element was included in the next version of the definition if >80% of respondents judged it as important or very important, and excluded if >50% judged it as not important or moderately important (17). The suggested reformulations of the second HIS definition were analysed with the nominal group technique by using qualitative and quantitative data from the first Delphi iteration. These reformulated items were presented in the second Delphi iteration.

2.1.3 The Consensus Group Technique

Following two Delphi iterations and two nominal group techniques, a consensus group technique (a combination of a focus group and a public meeting) was employed. The main difference between consensus groups and focus groups is that in the latter, the moderator or analyst decides, whereas in consensus groups, the participants themselves negotiate and decide the findings (18). We used this technique at a three-day meeting of all ISTEW project members held in Bled (June 2014), Slovenia. The consensus group included 18 participants from seven European countries. We wanted to provide everyone in the group the opportunity to work collaboratively, to be involved in the decision-making processes, to be valued as experts, and for the group to become a forum for change (19). Consensus group members were discussing quantitative and qualitative data of the 2nd Delphi iteration and the suitability of the developed HIS definition. The aim was to arrive at a final definition of HIS.

2. 2 The Sample

A non-random convenience sample was used for the Delphi process. Each project team invited 10–15 people they knew to be involved in HIS in their respective settings. 'Participants' came from seven European countries (England, Italy, Poland, Romania, Scotland, Slovenia, and Spain) and from different healthcare areas. The total number of respondents in the 1st iteration was 87; of these, 66 chose to participate in the 2nd iteration. HIS fields in which the respondents were involved are shown in Table 1.

Table 1. Participants' fields of work in the Delphi study.

	Education, research	Management	Clinical practice	Public policy	Patient organisations
1st iteration (n=87)	37% (32)	29% (25)	23% (20)	7% (6)	4% (4)
2nd iteration (n=66)	27% (18)	39% (26)	23% (15)	5% (3)	6% (4)

Ten members of the research group participated in the nominal group technique, and 18 members of the ISTEW project group participated in the consensus group technique. Members of both groups were experts in HIS from different professions.

2.3 Research Conduction and Ethical Approval

The research was conducted from November 2013 to September 2014. We started with the nominal group technique, first conducted in November 2013 and then in March 2014, followed by the Delphi process (the first and second iterations in December 2013 and April 2014, respectively), and finally, the consensus group technique in June 2014.The research protocol was approved by the scientific ethical committee of the research coordinator, the Faculty of Health Care Jesenice (Slovenia). Partners also adhered to their ethical approval processes for research. Participants were assured about the anonymity and confidentiality of their collaboration. The questionnaires were available either in English or the language of the expert. Partners were responsible for translating the questionnaires, as required.

2.4 Data Analysis

Quantitative data analysis was carried out with descriptive statistics (Mean, Standard Deviation, Frequency, Percentage) and bivariate statistics (Chi-Square (p) – Kruskal-Wallis H nonparametric test, Independent-samples t-test, Paired samples t-test, Pearson correlation, Spearman correlation) in the statistical software programme SPSS, v. 20.0. The level of statistical significance was set at $p<0.05$.

Qualitative data was obtained from the open-ended questions of the first and second Delphi iterations. First, each partner team extracted the themes from the qualitative data from both Delphi iterations and exposed these themes in the nominal group technique and the consensus group technique. The software programme NVivo, v. 10.0 and content analysis were used.

3 RESULTS

3.1 Characteristics of Respondents in the Delphi Survey

We asked respondents to classify themselves in three ways: those who worked in the field of HIS daily (this group we called 'expert'), those who worked in the field of HIS occasionally (this group we called 'occasional worker'), and those who were informed about HIS (this group we called 'informed layman'). In the 1st Delphi iteration, significant differences were established between countries in identifying respondents as experts of HIS ($p<0.001$), occasional workers ($p=0.033$) or informed laymen ($p<0.001$). The number of answers 'Yes' was 97; 10 respondents recognized themselves in more than one way. In the 2nd Delphi iteration, significant differences were established between respondents in identifying HIS 'expert' ($p=0.002$) and in classification as an 'informed layman' ($p=0.020$). The number of answers 'Yes' was 85; 19 respondents recognized themselves in more than one way. Results are in Table 2. We had more experts and occasional workers in the second iteration, and less informed laymen.

Table 2. Respondents' involvement in HIS and differences between countries.

Groups of respondents	1st Delphi iteration		2st Delphi iteration	
	Yes f (%)	X^2 (p)	Yes f (%)	X^2 (p)
'Expert'	21 (28.0)	**24.411 (<0.001)**	30 (45.5)	21.181 (0.002)
'Occasional worker'	44 (62.9)	**13.687 (0.033)**	31 (47.0)	11.172 (0.083)
'Informed layman'	32 (48.5)	2.614 (0.856)	24 (26.7)	15.048 (0.020)

Comment: X^2 (p) is answer 'Yes' between countries.

A total of 50% of respondents agreed that their national bodies, commissions or government which include HIS play an important part in healthcare and social policy in their country ($n=43$, $x^2=37.502$, $p<0.001$). A total of 25 respondents (35.2%) agreed that HIS has an accepted status in healthcare or social organizations, and 29 respondents (35.4%) reported that national scientific research in HIS has been conducted in their country. We did not collect this data in the 2nd iteration.

3.2 Results of the 1st Delphi Iteration

In the 1st iteration, we tested the definition of HIS which was developed with the nominal group technique. The definition is shown in Table 3. Results reveal a high level of agreement with the definition as a whole on a 5-point scale. Respondents from Scotland expressed a significantly lower agreement with the definition as a whole, but with the highest level of standard deviation of their answers ($M=2.83$, $SD=1.27$, $p<0.001$) and also with its separate parts (a) ($M=2.25$, $SD=1.22$, $p<0.001$), (c) ($M=2.67$, $SD=0.99$, $p<0.001$), (d) ($M=2.57$, $SD=1.78$, $p=0.029$), except for parts (b) and (e).

Table 3. Results for the level of agreement with the definition as a whole and with its separate parts (a – e), and differences between countries in the 1st Delphi iteration (n=87).

	M (SD)	Chi-Square (p)
Agreement with the definition as a whole, from the part a to the part e.	3.93 (0.861)	**21.533 (<0.001)**
Healthcare Improvement Science (HIS) is the framework for achieving efficiency, efficacy and quality in health and social care (a).	3.85 (1.070)	**30.278 (<0.001)**
HIS depends on knowledge from a wide range of sources, not just research (b).	4.15 (0.958)	7.921 (0.244)
HIS is a link (connection) between numerous variables in clinical work and management/leadership work, such as: multi-disciplinary approach, patient involvement, patient safety, total quality management, change management, personal involvement of healthcare/social workers, personal development and responsibility, team work/group work, connections between practice-theory-problems-research, etc. (c).	4.15 (0.907)	**27.436 (<0.001)**
HIS is thus an umbrella term for all actions (practice, education, science and policy) that can lead to better health treatment outcomes (health), better system performance (care), better professional development (learning) and healthier communities (d).	4.01 (1.101)	**14.017 (0.029)**
HIS also demands flexibility and responsibility in our understanding, in our theories of knowledge, and in our use of research evidence in health care improvement strategy (e).	4.26 (0.767)	7.319 (0.292)

Legend: M – central value of a discrete set of numbers calculated by the sum of the values divided by the number of values; SD – Standard deviation; Chi-Square (p) – Kruskal-Wallis H nonparametric test for several independent samples; a, b, c, d, e – parts of the whole definition.
Comment: X^2 (p) is mean value between countries.

The agreement with the definition increased with the level of respondents' expertise. Correlation analysis showed us that respondents who identified themselves as 'experts' were in positive correlation with the agreement with the definition as a whole (r=0.264, p=0.023). Respondents' fields of work were not in correlation with the level of agreement with the definition as a whole.

Qualitative responses of respondents (n=21) who rated themselves as experts were analysed. A review of responses to the question 'Which areas are missing from the proposed definition?' yielded 120 codes and 8 main categories, namely the content of the definition, the purpose of the definition, multidisciplinary approach, definition structure, healthcare professionals, negative consequences, innovative emergent field, and references. Word frequency of codes revealed that, in the opinions of HIS experts, the most frequent words to be included in the proposed definition are the following: Improvement (n=19), social (n=14), science (n=13), health (n=10), methods (n=10), healthcare (n=9), care (n=8), patient (n=8) and work (n=8).

3.3 Results of the 2nd Delphi Iteration

In the second iteration, we tested the definition of HIS developed with the nominal group technique, where the results from the first Delphi iteration were used. The definition is worded in Table 4. The average level of agreement with the second proposed definition of HIS was higher (M=4.30) compared to the first iteration (M=3.93) (t=-3.006, p=0.004). The average portion of agreement in the first iteration was 78.5% and in the second 86%. For separate parts of the definition, the greatest agreement was expressed with the part (b).

Table 4. Results for the level of agreement with the definition as a whole and with its separate parts (a – f), and differences between countries in the 2nd Delphi iteration (N= 66).

	M (SD)	Chi-Square (p)
Agreement with the definition as a whole, from the part a to the part f	4.30 (0.61)	**21.227 (0.002)**
Healthcare Improvement Science (HIS) is focused on safety, effectiveness, efficiency, timeliness, equity and continuous patient-centred improvement in healthcare (a).	4.29 (0.86)	**7.727 (0.259)**
HIS depends on valid and reliable knowledge from a wide range of sources, in both the academic sector and service sector in healthcare (b).	4.40 (0.86)	7.611 (0.268)
HIS is multidisciplinary in its approach, drawing both on biomedical and on social sciences (c).	4.33 (0.81)	11.468 (0.075)
Different factors, such as methodological frameworks for improvement, knowledge of healthcare professionals, patient involvement and innovation, support organizational culture, are factors that interplay with the approach (d).	4.14 (0.96)	**14.904 (0.021)**
HIS is thus an umbrella term for any action (practice, education, science and policy) that can lead to improved healthcare outcomes for people, better health system performance and also healthier communities (e).	4.26 (0.83)	11.226 (0.082)
HIS also demands flexibility and responsibility in understanding, in theories of knowledge, and in the use of research evidence in health care improvement strategy (f).	4.24 (0.77)	**16.761 (0.010)**

Legend: M – central value of a discrete set of numbers calculated by the sum of the values divided by the number of values; SD – Standard deviation; Chi-Square (p) – Kruskal-Wallis H nonparametric test for several independent samples; a, b, c, d, e – parts of the whole definition.
Comment: X^2 (p) is mean value between countries.

Expertise in the field of HIS and respondents' area of work did not significantly correlate with the agreement with HIS definition. Significant differences in the definition as a whole were established between partners (p<0.001). For example, respondents from Scotland expressed a significantly lower agreement with the definition as a whole (M=3.50, SD=0.53) and also with the part (f) (M=3.45, SD=0.93). Moreover, respondents from Scotland (M=3.36, SD=1.43) and England (M=3.20, SD=0.84) expressed a significantly lower agreement with the part (d). Detail results are in Table 5.

Table 5. Results of countries look for the level of agreement with the definition as a whole and with its separate parts (a – f) in the 2nd Delphi iteration.

	N	M (SD)	England	Italy	Poland	Romania	Slovenia	Spain	Scotland	Chi-Square (p)
Whole definition	64	4.30	4.20	4.33	4.33	4.56	4.71	4.47	3.50	5.613
		0.61	(0.45)	(0.50)	(0.50)	(0.53)	(0.49)	(0.52)	(0.53)	(<0.001)
Part a	65	4.29	4.40	4.20	4.67	4.56	4.57	4.20	3.70	1.456
		0.86	(0.55)	(1.23)	(0.50)	(0.53)	(0.54)	(0.86)	(1.06)	(0.210)
Part b	65	4.40	4.20	4.30	4.56	4.50	4.86	4.40	4.09	0.676
		0.86	(0.84)	(0.48)	(1.01)	(0.76)	(0.38)	(1.06)	(1.04)	(0.669)
Part c	66	4.33	3.60	4.10	4.67	4.44	4.86	4.40	4.09	1.923
		0.81	(0.89)	(0.88)	(0.50)	(0.53)	(0.38)	(0.91)	(0.94)	(0.092)
Part d	66	4.14	3.20	4.20	4.22	4.56	4.57	4.47	3.36	3.473
		0.96	(0.84)	(0.63)	(0.83)	(0.53)	(0.54)	(0.74)	(1.43)	(0.005)
Part e	66	4.26	4.20	4.30	4.11	4.44	4.71	4.53	3.55	2.389
		0.83	(0.45)	(0.48)	(0.93)	(0.53)	(0.76)	(0.52)	(1.29)	(0.039)
Part f	66	4.24	4.20	4.20	4.33	4.44	4.86	4.40	3.45	3.648
		0.77	(0.45)	(0.42)	(0.50)	(0.73)	(0.38)	(0.83)	(0.93)	(0.004)

3.4 Results of the Consensus Group Technique

The consensus group technique started with a discussion of 18 experts from institutions involved in the ISTEW project. It was moderated by the principal investigator and research fellow for the project, with notes being taken. First, the aim was to increase the understanding of the first and second Delphi iteration results and to present partners' qualitative analysis results. The consensus group discussion yielded 14 key themes of the HIS definition, which were merged into 3 content categories, namely 'country differences knowledge', 'science and HIS,' and 'new dimension of HIS for practice'. The strongest extracted elements were knowledge, change, outcome, population, safety, efficiency, person-centred.

All partners agreed that the HIS definition had to be short and concise. The emphasis of each definition part and the theme from qualitative data was discussed until a consensus was reached. Based on this, the final consensus on the definition of Healthcare Improvement Science is as follows:

'Healthcare improvement science is the generation of knowledge to cultivate change and deliver person-centred care that is safe, effective, efficient, equitable and timely. It improves patient outcomes, health system performance and population health.'

4 DISCUSSION

HIS is incorporated into every phase of healthcare proceedings and is, consequently, a complex concept to define. Coining a definition that encompasses the multi-faceted nature of HIS with all of its variables is very challenging, particularly because the use of the term HIS and its synonyms in the existing literature and other educational documents (grey literature) varies depending on the country and language.

By applying consensus methods, the definition was developed gradually. According to the results of two Delphi iterations, a high consensus among participants was achieved. Consensus increased from the first iteration to the second, until 86% agreement was reached. It is very important that the definition was developed through interprofessional interactions. Only a third of respondents in the Delphi survey perceived themselves as experts in HIS, although the Delphi study coordinators identified them as such. This, we suggest, reflects the extent to which HIS is developed in the partner countries involved, as we found that HIS was not equally developed in all partner countries. Indeed, we found that the term itself is not used at all in Spain, and that the concept is not well developed in Romania, where the term implementation science with its different connotations tends to be more common. Respondents coming from countries where HIS was not broadly developed may have found it challenging to respond in an informed way. Respondents from Scotland, where HIS is a political priority, expressed a significantly lower level of consensus with the entire definition compared to non-English speaking respondents, but the level of agreement was still high at 70%. These differences may be related to a number of issues. Firstly, most respondents from Scotland defined themselves as experts in HIS. Secondly, in Scotland, HIS is a more crucial driver of healthcare institution policies compared to the other countries. Finally, research and accessibility of scientific and professional HIS literature is greater in the United Kingdom compared to other non-English native speaking countries (20).

The definition formed in two Delphi iterations was a broadened one. The consensus group technique greatly contributed to reaching a compromise between experts, so that a short and concise version of the definition was developed. The definition includes a wide range of key themes, such as knowledge for cultivating change, person-centred care, improvement of patient outcomes, health system performance and population health. These themes are also included in definitions proposed by other authors (4, 8). The employed method for developing a definition leads to a better understanding of practice (11).

Only half of respondents agreed that HIS-related national bodies play an important role in health and social care policies in their own country. However, a closer look at the data reveals that the situation is not comparable across countries. Only one third of respondents felt that HIS has an appropriate status in their national healthcare system. As a result, HIS indicators are not developed well and HIS is an uncommon term in some countries. This is a major issue because, as Booth et al. (21) stated, changing population demographics, disease patterns and new research findings demand change in healthcare and require new ways for ensuring continuous improvement. Robson (22) believes that in making healthcare safer, one should join all levels of the profession in an effort to clearly work with their working environment and patient safety.

For a continuous improvement, an understanding and recognition of the need for HIS are crucial. Our definition underpins the need for developing interprofessional study programmes and other materials. Hall and Zierler (23) stressed that, with the growth of interprofessional education and practice in healthcare schools, faculty members have to assume new roles in designing and delivering interprofessional curricula. Senior leadership support is also vital in ensuring sustainable change, and it will be a key requirement in healthcare organisations and universities to make healthcare improvement a priority.

5 LIMITATIONS

The sample was not equally weighted for the nationalities of the HIS experts, and this may have impacted the Delphi process. Knowledge of the English language and familiarity with it may have also played a role in providing answers, in questionnaire translation, and in discussions within the nominal and consensus groups. In countries where English is not spoken as the official language, most partners had to first translate the questionnaire, then obtain answers from experts in their languages, and translate the responses back into English. This may have resulted in the loss of understanding and different interpretations. This study has only included seven European countries; consequently, it would be interesting to explore the ways in which HIS is understood, practised and taught across Europe as a whole.

6 CONCLUSION

A new consensus definition of HIS was developed in a European context. The consensus method approach was pertinent to unify the new concept from multidisciplinary, interprofessional and multicultural perspectives. Having a shared definition of HIS is important to boost healthcare culture and professional training processes. The definition enables higher education institutions in health and social care to address this gap in their curricula, and ensure that improvement science becomes a core competency for all healthcare graduates.

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CONFLICTS OF INTEREST

The authors report no conflicts of interest.

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ETHICAL APPROVAL

The research protocol was approved by the Senate Committee for Science, Research and Development at the Faculty of Health Care Jesenice (FHCJ) in December 2013. The serial number of Ethics Approval is 12/5 in the academic year 2013/2014. Partners also adhered to their ethical approval processes for research. Participants received written information about different aspects of the study; explained to them were their rights on voluntary participation and withdrawal from the study at any time, as well as their privacy and confidentiality rights.

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Ivetić V, Pašić K, Selič P. The effect of an educational intervention in family phisicians on self-rated quality of life in patients with medically unexplained symptoms.
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THE EFFECT OF AN EDUCATIONAL INTERVENTION IN FAMILY PHISICIANS ON SELF-RATED QUALITY OF LIFE IN PATIENTS WITH MEDICALLY UNEXPLAINED SYMPTOMS

VPLIV EDUKATIVNE INTERVENCIJE ZDRAVNIKOV NA SAMOOCENO KAKOVOSTI ŽIVLJENJA, ZADOVOLJSTVA Z OBRAVNAVO IN PARTNERSKEGA ODNOSA Z ZDRAVNIKOM DRUŽINSKE MEDICINE PRI BOLNIKIH Z MEDICINSKO NEPOJASNJENIMI STANJI

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ABSTRACT

Introduction. Medically unexplained symptoms (MUS) are very common in family medicine, despite being a poorly-defined clinical entity. This study aimed to evaluate the effect of an educational intervention (EI) on self-rated quality of life, treatment satisfaction, and the family physician-patient relationship in patients with MUS.

Methods. In a multi-centre longitudinal intervention study, which was performed between 2012 and 2014, patients were asked to rate their quality of life, assess their depression, anxiety, stress and somatisation, complete the Hypochondriasis Index, the Medical Interview Satisfaction Scale and the Patient Enablement Instrument for assessing the physician-patient relationship, before and after the EI.

Results. The mean values before and after the intervention showed that after the EI, patients with MUS gave a lower (total) mean rating of their health issues and a higher rating of their quality of life, and they also had a more positive opinion of their relationship with the physician ($p<0.05$). However, there were no differences in the (total) rating of treatment satisfaction before and after the EI ($p=0.423$). Significant differences in the symptoms in patients with MUS before and after the intervention were confirmed for stress, somatisation and hypochondriasis ($p<0.05$).

Conclusions. It could be beneficial to equip family physicians with the knowledge, skills and tools to reduce hypochondriasis and somatisation in MUS patients, which would improve patients' self-rated health status.

Keywords:
medically unexplained symptoms, family medicine, educational intervention, quality of life, treatment satisfaction, family physician-patient relationship

IZVLEČEK

***Uvod**. V družinski medicini so medicinsko nepojasnjena stanja (MNS) pogosta, vendar slabo opredeljena klinična entiteta; od 2,5 do 25% bolnikov, ki obiskujejo zdravnika, se pritožuje zaradi telesnih simptomov, za katere ni mogoče odkriti patofiziološkega vzroka. Namen študije je bil odkriti dejavnike, povezane s samooceno kakovosti življenja pri bolnikih z MNS v povezavi z edukativno intervencijo (EI), ki so ji bili podvrženi zdravniki.*

***Metode**. K sodelovanju v multicentrični vzdolžni intervencijski raziskavi, ki je potekala od leta 2012 do leta 2014, je bilo povabljenih 90 zdravnikov družinske medicine, v sodelovanje jih je privolilo 63 (70% ali 7,5% vseh timov družinske medicine v Sloveniji). Po koncu prve faze je bila polovica zdravnikov (32 od 63) povabljena na dvodnevno usposabljanje s področja prepoznavanja in obravnave bolnikov z MNS. Bolniki so pred EI in po njej izpolnjevali vprašalnike o kakovosti življenja, depresiji, anksioznosti, stresu in somatizaciji, hipohondriji, zadovoljstvu in o partnerskem odnosu z zdravnikom.*

***Rezultati**. Zdravniki so s sistematičnim vzorčenjem povabili k sodelovanju 1410 bolnikov, v sodelovanje je privolilo 826 (58,58%) bolnikov, od tega 422 z izpolnjenimi kriteriji za MNS: (1) starost (18 do 80 let), (2) zdravnikov sum in (3) izpolnjeni točkovni in klinični kriteriji za MNS (prisotnost simptoma vsaj tri mesece, klinično pomembne težave pri bolniku, nezmožnost razlage simptoma s katerokoli znano telesno boleznijo). Povprečna starost bolnikov je bila 50,35 leta ± 11,49 leta, izstopale so ženske (64,9 %) in osebe z osnovnošolsko (23,7%) in srednješolsko izobrazbo (29,1%). Brezposelnih je bilo 28,9% bolnikov. Bolniki z MNS so po intervenciji izkazovali v povprečju nižjo (skupno) oceno težav in višjo kakovost življenja ter boljše mnenje o partnerskem odnosu z zdravnikom ($p<0,05$), ne pa razlik v (skupni) oceni zadovoljstva z obravnavo pred intervencijo in po njej ($p=0,423$). Značilne razlike v simptomih pri bolnikih z MNS pred intervencijo in po njej smo potrdili v primeru stresa, somatizacije in hipohondrije ($p<0,05$).*

***Zaključki**. Edukacija zdravnikov je pri bolnikih z MNS izboljšala samooceno težav z zdravjem in kakovosti življenja, vplivala je na znižanje stopnje simptomov stresa, somatizacije in znižala stopnjo hipohondrije ter izboljšala mnenje bolnikov o partnerskem odnosu z zdravnikom. Do sedaj v Sloveniji MNS kot ena od specifičnih vsebin dela v družinski medicini niso bila dovolj raziskana, tudi pristopi k obravnavi bolnikov z MNS še niso bile oblikovani. Zdravnike bi kazalo opremiti z znanji, veščinami in orodji za zmanjševanje hipohondrije in somatizacije pri bolnikih z MNS, saj bi na ta način tudi izboljšali samooceno zdravja bolnikov.*

Ključne besede:
medicinsko nepojasnjena stanja, družinska medicina, edukacijska intervencija, kakovost življenja, zadovoljstvo bolnikov, odnos med družinskim zdravnikom in bolnikom

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1 INTRODUCTION

Medically unexplained symptoms (MUS) are very common in family medicine despite being a poorly-defined clinical entity; approximately 2.5%-25% of patients who visit a family physician (FP) complain of physical symptoms for which no physical pathology can be found even after a number of examinations (1-2). The diagnosis of MUS still has a very negative connotation for patients (3). A recent Slovenian study (4) observed an 8.6% frequency of MUS in family medicine practice attendees, which shows that MUS is as much a public health care problem in Slovenia as anywhere else in the world (1, 2). Other Slovenian studies on the new project of model practices in family medicine did not show any more successful treatment of patients with MUS (5).

Some studies show that depression and anxiety disorders are comorbid with medically unexplained conditions (6). In the literature, MUS are often described as equivalent to somatoform disorders, but studies show that only approximately 25% of MUS patients meet the criteria for one of the somatoform disorders according to the Diagnostic and Statistical Manual of Mental Disorders, 4th Edition (DSM-IV-TR), and the 10th revision of the International Statistical Classification of Diseases and Related Health Problems (ICD-10) (7-9), which means that MUS is a problem which goes beyond the definition and criteria for somatoform disorders. Recent international studies emphasise the importance of one or more psychosocial stressors that could not be identified either by the patients or the physicians (10). Following an explanation of how such stressors can affect the occurrence of physical symptoms in patients, five areas were researched in detail, namely everyday stress and problems in life, prolonged effect/effects of childhood stress, physical manifestation of depression, post-traumatic stress disorder (PTSD), and anxiety (11).

According to the results (12), the pharmacological treatment of MUS is among the most common interventions. Also very common is the use of cognitive behavioural methods and other non-specific interventions. Cognitive behavioural approaches proved to be the most effective (12) and were confirmed (13) as being useful in reducing medically unexplained chronic fatigue in the paediatric population (aged from 11 to 18 years).

The aim of our study was to examine the effect of an educational intervention (EI) for FPs on the MUS patients' self-rated quality of life, treatment satisfaction and relationship with the physician.

2 METHODS

2.1 Participants and Procedures

2.1.1 Participating Physicians

A total of 90 family medicine practices or FPs from across Slovenia were invited to participate in a multi-centre longitudinal intervention study. The recruitment of the physicians was carried out between January and March 2012. The practices were selected by random sampling from the publicly available register of all Slovenian family medicine practices provided by the Institute of Public Health of the Republic of Slovenia (ZZZS) (14). This register enabled us to include in our study a population with a great socioeconomic diversity and different ethnic backgrounds. Out of 90 invited physicians, a total of 63 (70%) decided to take part in the first phase of our study (7.5% of all family medicine teams in Slovenia) (14).

The FPs were mailed the Study Protocol and Questionnaires. After completing the first phase of the study, half of the physicians (32 of 63) were invited to attend a two-day training on the identification and treatment of patients with MUS. All the invited physicians attended the training and were taught about the basic principles of cognitive behavioural therapy (CBT), mental illness diagnostic criteria and a proper multidisciplinary approach toward patients with MUS. Finally, a Model of Careful Assessment (MCA) as an intervention in the treatment of patients with MUS was introduced and trained. In the continuation of the study, those physicians represented the intervention group. Every three months during a 12-month period, they were sent by post a clinical vignette of a patient with MUS, which was also used in the workshops, as well as a MCA. In this way, the intervention group participants were able to refresh their newly gained knowledge. The physicians from the control group were sent only the technical instructions for the conduct of the study.

In the second phase of the study, a total of 45 (23 from the intervention group and 22 from the control group) of the participating physicians decided to continue their participation, which represented 5.36% of all family medicine teams in Slovenia (Figure 1).

In physicians, attendance at the two-day training counted as inclusion criteria for intervention group, which in fact acted as an interventional variable when following up several characteristics in MUS patients.

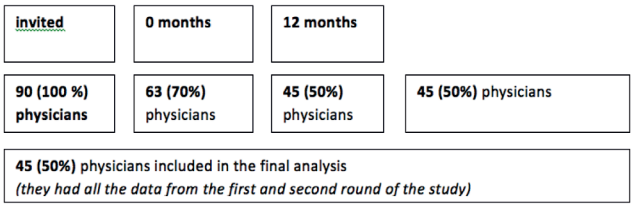

Figure 1. A graphic presentation of the number of physicians participating in either phase of the study.

2.1.2 Participating Patients

For three consecutive 'typical' working days, determined by the participating physicians themselves, patients aged between 18 and 80 years who came to the practice for any reason and who were suspected of MUS were invited by their physician to participate in this study. The physicians screened a total of 4,921 patients and invited 1,410 of them; 584 (41.42%) of the invited patients refused to take part in the study. The most common reason for non-participation was lack of time.

In the end, a total of 826 (58.58%) of patients decided to participate in the first phase of the study, with 422 of these fulfilling the criteria for MUS (patient age between 18 and 80 years, suspicion of MUS, and fulfilled criteria for MUS from Questionnaire B) and 404 patients not fulfilling the criteria for MUS. The latter were not followed-up.

In the second phase of the study (carried out between April 2012 and June 2013), 510 of the 1,410 initially invited patients (36.17%) decided to continue their participation; of those, 269 patients had MUS. Those 269 MUS patients were analysed after the 12-month period.

Figure 2 shows the participation of patients by the study phase.

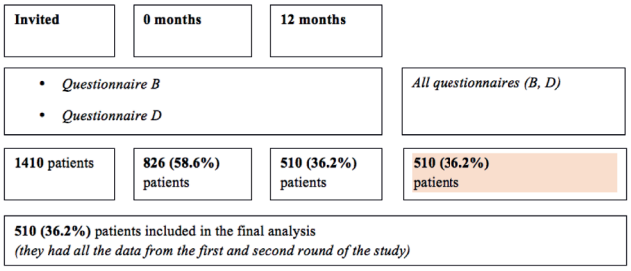

Figure 2. A graphic presentation of the number of patients participating in either phase of the study.

2.2 Instruments

The FPs were asked to complete Questionnaire A (demographic information about the physician and practice), whereas the patients answered Questionnaire B, consisting of the PHQ-15 (Patient Health Questionnaire) for assessing the severity of non-specific somatic symptoms that have been shown to be highly associated with MUS diagnosis in the past four weeks (15), and three additional questions regarding the patients' problems and the physicians' clinical opinion (i.e., the symptom has been present for at least three months, the symptom has been causing clinically significant problems for the patient, and the symptom cannot be explained by any known physical disease) (1). A PHQ-15 score of 15 or higher and positive answers to all three additional questions formed the criteria for the inclusion of patients with MUS. The patients were also asked to complete Questionnaire D, which included theEQ-5D-3L (EuroQoL 5D-3L) instrument rating quality of life (16), as well as the 4DSQ (Four-Dimensional Symptom Questionnaire) for assessing depression, anxiety, stress and somatisation (17), the WI (Whiteley Hypochondriasis Index) (18), the MISS-21 (Medical Interview Satisfaction Scale) for measuring patient satisfaction (19), and the PEI (Patient Enablement Instrument) for assessing the physician-patient relationship (20).

Questionnaires A and B were completed only in the first phase of the study (0 months), and Questionnaire D was completed at inclusion into the study (0 months) and 12 months later. The latest data are crucial for this study aim, providing 269 MUS patients´ reflection on depression, anxiety, stress and somatisation, satisfaction, and also assessing the physician-patient relationship.

2.3 Statistical Analysis

Those parts of the questionnaire which were adapted from international questionnaires were assessed for their construct validity (using factor analysis) and measuring reliability. The reliability of all measures was exemplary (Cronbach's alpha $\alpha>0.80$). To analyse the differences in MUS patients before and after the EI, we used the paired sample t-test for numeric variables and the chi-square test for categorical variables. Statistical significance for the entire analysis was set at a 5% risk level ($p\leq0.05$).

The data were statistically processed using SPSS 21.0 statistical software (IBM Corp., Grouponk, NY, USA).

3 RESULTS

At the beginning of the recruitment process, there were 422 patients in the group with MUS, and 404 patients in the group without MUS.

Gender structure: The whole cohort consisted of 826 patients; 62.2% were women and 37.8% were men. The number of women was higher in the MUS patient group (64.9%), compared to the group without MUS (59.4%). However, this relatively higher proportion of women in the MUS group was not statistically significant (x2=2.679; df=1; p=0.102).

Patients' age: The mean age of patients was 49.40±12.29 years. The mean age of patients with MUS was 50.35±11.49 years, which is approximately two years older than the mean age of patients without MUS (48.41±13.01 years; p=0.040).

Educational level and employment status: The MUS group included 23.7% of patients who were primary school graduates (primary school leaving age is 14 in Slovenia), whereas in the group without MUS there were 13.9% of patients with primary school only; secondary education was completed by significantly fewer patients in the MUS group (29.1%) as compared to 38.9% of patients without MUS (p=0.002). The majority of patients had completed vocational (31.7%) and secondary (33.9%) education; those were followed by primary education (18.9%), post-secondary, higher or university education (14.4%), and Master's or Doctoral degree (1.1%). Most patients were in employment (39.8%), followed by retired people (26.9%) and the unemployed (21.3%); 9.0% of patients indicated that they were self-employed or farmers, whereas 3.0% were secondary school or university students. A statistically significant greater proportion of patients with MUS were unemployed (with MUS: 28.9%; without MUS: 13.4%) a smaller proportion of them were employed (with MUS: 34.1%; without MUS: 45.7%), and a smaller proportion of them had secondary school or university student status (with MUS: 1.7%; without MUS: 4.5%; p=0.000).

Other characteristics: There were no statistically significant differences observed between the two groups of patients in terms of settlement size (p=0.8865). Patients with MUS differed from others by the number of persons in the household (p = 0.028). In other words, patients with MUS lived in significantly larger households (3.39±1.46 members vs. 3.17±1.45 members).

3.1 The Effect of EI on Self-Rated Quality of Life, MUS, Hypochondriasis, Patient Satisfaction, and the Physician-Patient Relationship

Table 1. The analysis of differences in the (total) rating of health issues, quality of life, treatment satisfaction and the physician-patient relationship in patients with MUS, before and after the intervention.

		BEFORE INTERVENTION n=422	AFTER INTERVENTION n=269	*P*
(Total) rating of health issues				
Mean ± standard deviation		8.51±1.40	8.16±1.45	*0.000*
95% confidence interval				
	lower limit	8.38	7.98	
	upper limit	8.65	8.33	
Quality of life (self-rated health)				
Mean ± standard deviation		44.81±11.927	48.21±11.722	*0.000*
95% confidence interval				
	lower limit	43.67	46.80	
	upper limit	45.95	49.62	
(Total) rating of treatment satisfaction				
Mean ± standard deviation		3.72±0.400	3.71±0.304	*0.423*
95% confidence interval				
	lower limit	3.68	3.68	
	upper limit	3.76	3.75	
Opinion on the physician-patient relationship				
Mean ± standard deviation		2.69±0.48	2.39±0.53	*0.000*
95% confidence interval				
	lower limit	2.65	2.33	
	upper limit	2.74	2.45	

Table 2. The analysis of differences in the symptoms of MUS patients, and the hypochondriasis index before and after the intervention.

		BEFORE INTERVENTION n=422	AFTER INTERVENTION n=269	*P*
Depression (Criterion: depression >2)		**n=260 (61.6%)**	**n=170 (63.2%)**	
Mean ± standard deviation		3.92±3.270	3.85±3.100	*0.051*
95% confidence interval				
	lower limit	3.61	3.48	
	upper limit	4.24	4.22	
Anxiety (Criterion: anxiety >8)		**n=126 (29.9%)**	**n=77 (28.6%)**	
Mean ± standard deviation		6.53±5.325	6.36±5.145	*0.558*
95% confidence interval				
	lower limit	6.02	5.74	
	upper limit	7.04	6.97	
Stress (Criterion: stress >10)		**n=367 (87.2%)**	**n=237 (88.1%)**	
Mean ± standard deviation		19.57±7.216	18.64±6.701	*0.000*
95% confidence interval				
	lower limit	18.88	17.83	
	upper limit	20.26	19.44	
Somatisation (Criterion: somatisation >10)		**n=393 (93.1%)**	**n=248 (92.2%)**	
Mean ± standard deviation		19.49±5.728	18.54±5.585	*0.000*
95% confidence interval				
	lower limit	18.94	17.87	
	upper limit	20.04	19.21	
Whiteley Hypochondriasis Index		**n=422 (100%)**	**n=269 (100%)**	
Mean ± standard deviation		45.31±9.732	44.16±8.785	*0.000*
95% confidence interval				
	lower limit	44.38	43.11	
	upper limit	46.24	45.22	

4 DISCUSSION

The aim of our study was to investigate the effect of the EI in physicians on some factors associated with quality of life and the perception of the relationship with the selected physician in patients with MUS. The mean values before and after the intervention showed that after the EI, patients with MUS gave a lower (total) mean rating of their health issues and a higher rating of their quality of life, and they also had a more positive opinion about their relationship with the physician ($p<0.05$; Table 1). However, there were no differences in the (total) rating of treatment satisfaction before and after the EI ($p=0.423$) (Table 1). Significant differences in the symptoms in patients with MUS before and after the intervention were confirmed for stress, somatisation and hypochondriasis ($p<0.05$; Table 2).

The study topic corresponds to the current public health care policies and needs in Slovenia and around the world (11, 22, 23). The EI for physicians was prepared as a combination of several different approaches to treating patients with MUS in accordance with recommendations in the literature (21), focusing on practical work in small groups and presenting the MCA tool (24). A German study from 2007 (25) investigated the effect of a one-session

EI using a cognitive-behavioural approach, observing a reduced number of visits to practices and fewer somatisation symptoms at 6-month follow-up. In our study, the intervention`s impact was evaluated through patients' self-rated quality of life, treatment satisfaction, and their assessment of the physician-patient relationship, as well as through somatisation, anxiety, depression and hypochondriasis (Table 1, Table 2). We could not find such criteria (as a whole) in the available body of literature.

4.1 EI and Self-Rated Quality of Life

After the EI, patients with MUS gave a lower (total) mean rating of their health issues and a higher self-rating of their quality of life (Table 1). A more recent Dutch study (26), which also employed the EQ-5D questionnaire, observed that MUS have a greater effect on the quality of life in a younger population (aged less than 65 years). A Slovenian study from 2014 (16) found that – considering the results of the EQ-5D questionnaire – the presence of psychological symptoms is associated with lower quality of life. Klemenc Ketiš et al. (16) observed a correlation between factors identified using the EQ-5D questionnaire (the presence of chronic disease, pain, and anxiety and depression), which are independently associated with psychological symptoms. In addition, findings of other authors (27) confirm the correlation between psychological and unexplained symptoms, and lower quality of life, as measured by the EQ-5D questionnaire. We reached the same conclusion with regard to the patients' quality of life, and we also confirmed the EI's effect on patients with MUS in terms of their quality of life.

4.2 EI and Depression, Anxiety, Stress, and Somatisation and Hypochondriasis

In our study, patients with MUS had a lower mean level of depression, anxiety, stress and somatisation after the EI, and this reduction in stress and somatisation was confirmed as statistically significant (Table 2). Similar to our study, the majority of other studies (12, 28) found that improved communication with the MUS patient is beneficial, as is the use of empathy in the physician-patient relationship, or better acceptance of MUS patients as they are.

The analysis of differences in hypochondriasis in patients with MUS before and after the EI (Table 2) confirmed that the intervention – i.e., capacity building in physicians – significantly reduced (but did not eliminate altogether) hypochondriasis in MUS patients. A recent German study from 2013 (29) analysed the effect of the EI (a multidisciplinary approach and the inclusion of a psychosomatic therapist in the education of family physicians) on the treatment of MUS patients, and found a decrease in the level of hypochondriasis, which is comparable to the findings of our study.

4.3 EI and Patients' Treatment Satisfaction

Statistical analysis did not reveal significant differences in the (total) rating of treatment satisfaction before and after the EI (Table 1). Similarly, a study by Jackson, J. et al. (30) found that there were no significant differences in the treatment satisfaction of patients with MUS compared to patients without MUS. A study from Sri Lanka (31) investigated the effect of an intervention on several factors, including patients' treatment satisfaction, and showed that patient satisfaction increased after the EI (mainly the education of physicians in cognitive-behavioural techniques). Differences in the findings of various authors and those of this study are probably a result of the use of different types of intervention and different questionnaires for analysing patient satisfaction; this is why the findings are difficult to compare.

4.4 EI and the Patient-Physician Relationship

We found (Table 1) that intervention in patients with MUS significantly improved their opinion of the physician-patient relationship. The results of our study match those of another study carried out in Scotland (32), which showed that intervention in MUS patients significantly improved their opinion of the physician-patient relationship, but failed to confirm significant differences in the (total) rating of treatment satisfaction before and after the EI. We could not find any data on the intervention's effect on the physician-MUS patient relationship in comparable foreign studies (33, 34), which provides an opportunity for new research in this field, and for improving the quality of treatment of patients with MUS.

4.5 Limitations of the Study

The criteria for including patients in the group of patients with MUS are non-standardised, due to the non-existence of an accurate definition of MUS. For the purposes of this study, the inclusion criteria were based on a large review of the literature, and represented a combination of several factors to reduce this limitation. The acquisition of data excluded all physicians and patients who refused to participate in the study.

The study included patients who had visited their physician for three 'typical' working days, coming to the practice for different reasons, many due to an acute disease or the worsening of a chronic disease. Because of this, frequent visitors to family medicine practices had a greater chance of being included in the study. This study limitation could have been eliminated if we had included random sampling of patients using a register of family medicine practice patients, but the participation of patients would have most probably been even lower.

The decrease in the number of participating FPs and patients was relatively large by the end of the study,

which is also reported by other researchers of MUS (12, 35). We also failed to track possible patterns within the MUS patients group after one-year-period, and did not analyse characteristics of the fall-out patients.

The EI was relatively short (two days) and was a 'one-off.' The EI attendees were probably more motivated to participate (a personal interest in this topic) than other physicians.

The success of the EI was at first limited to the observation of quality of life, treatment satisfaction and opinion of the physician-patient relationship. However, this limitation has been mitigated by the fact that quality of life was additionally evaluated based on the assessment of somatisation, depression, anxiety and hypochondriasis. The success of the EI was followed up only over one-year-period. Unfortunately, we do not have any follow-up data for the participating physicians and patients after one year. We also do not have any follow-up data about the incidence of MUS symptoms after EI, neither about the frequency of patients' attendance at family clinics.

In this study, we decided not to record the occurrence of acute diseases or the worsening frequency of chronic disease, which might have affected the self-rated quality of life in our patients.

5 CONCLUSIONS

Education of physicians improved the self-rating of health issues and quality of life by patients with MUS. Moreover, it also helped to reduce symptoms of stress and somatisation, and decreased the level of hypochondriasis, while also improving patients' opinion of the physician-patient relationship. In Slovenia, MUS are still not sufficiently researched as a specific family medicine topic, and approaches to the treatment of patients with MUS have not yet been developed. Considering the results of our study, we find that it is necessary to equip FPs with knowledge, skills and tools for reducing hypochondriasis and somatisation in MUS patients. In this way, we could also improve their self-rated health status. In addition, the observed correlation with stress and anxiety highlights the necessity to manage anxiety in patients with MUS, and strengthen problem-centred strategies for managing stress.

CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest.

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ETHICAL APPROVAL

The study was approved by the National Medical Ethics Committee of the Republic of Slovenia, Decision No. 45/05/11bis dated 25 May 2011.

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USING MOVIES IN FAMILY MEDICINE TEACHING: A REFERENCE TO EURACT EDUCATIONAL AGENDA

UPORABA FILMOV V POUČEVANJU DRUŽINSKE MEDICINE NA OSNOVI KOMPETENC DRUŽINSKE MEDICINE

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ABSTRACT

Introduction. Cinemeducation is a teaching method where popular movies or movie clips are used. We aimed to determine whether family physicians' competencies as listed in the Educational Agenda produced by the European Academy of Teachers in General Practice/Family Medicine (EURACT) can be found in movies, and to propose a template for teaching by these movies.

Methods. A group of family medicine teachers provided a list of movies that they would use in cinemeducation. The movies were categorised according to the key family medicine competencies, thus creating a framework of competences, covered by different movies. These key competencies are Primary care management, Person-centred care, Specific problem-solving skills, Comprehensive approach, Community orientation, and Holistic approach.

Results. The list consisted of 17 movies. Nine covered primary care management. Person-centred care was covered in 13 movies. Eight movies covered specific problem-solving skills. Comprehensive approach was covered in five movies. Five movies covered community orientation. Holistic approach was covered in five movies.

Conclusions. All key family medicine competencies listed in the Educational Agenda can be taught using movies. Our results can serve as a template for teachers on how to use any appropriate movies in family medicine education.

Keywords:
family practice, medical education, narration, professional competences

IZVLEČEK

***Uvod**. Cinemeducation je metoda poučevanja z uporabo filmov ali filmskih izsekov. Namen te raziskave je bil oceniti, ali filme lahko uporabimo pri poučevanju družinske medicine na osnovi kompetenc družinske medicine, ki jih je predlagala Evropske akademija učiteljev v družinski medicini (EURACT).*

***Metode**. Skupina učiteljev družinske medicine je predlagala seznam filmov, ki bi jih lahko uporabili v poučevanju družinske medicine. Dva učitelja družinske medicine sta filme pregledala in na osnovi vsebine ter prizorov iz filmov za vsak film določila seznam kompetenc družinske medicine, ki se lahko s pomočjo določenega filma učijo. Kompetence družinske medicine so vodenje primarne zdravstvene oskrbe, v osebo usmerjena zdravstvena oskrba, zmožnost reševanja specifičnih problemov, celostni pristop, usmerjenost v skupnost in celovito oblikovanje modelov.*

***Rezultati**. Končen seznam je obsegal 17 filmov. Devet jih je zajemalo kompteneco vodenja primarne zdravstvene oskrbe. Kompetenca v osebo usmerjene zdravstvene oskrbe je bila zajeta v 13. filmih. Osem filmov je vsebovalo kompetenco zmožnosti reševanja specifičnih problemov. Celovit pristop je bil zajet v petih filmih, prav tako tudi kompetenca usmerjenosti v skupnost. Celosten pristop je bil zajet v petih filmih.*

***Zaključek**. Vse kompetence družinske medicine, ki jih je predlagal EURACT, se lahko učijo tudi s pomočjo filmov. Rezultati te raziskave lahko služijo kot predloga učiteljem družinske medicine glede načina uporabe filmov v izobraževanju iz družinske medicine.*

Ključne besede:
družinska medicina, medicinska izobraževanja, narativna medicina, profesionalne kompetence

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1 INTRODUCTION

Family medicine is a unique medical specialty, which does not only provide clinical care, but predominantly focuses on continuing, comprehensive and holistic care that is person-based (1). Family physician should therefore also possess special skills in order to be able to deliver appropriate care, such as communication skills.

The Educational Agenda produced by the European Academy of Teachers in General Practice/Family Medicine (EURACT) (2) has become a standard for developing family medicine curricula in Europe. This document is based on the European Definition of General Practice/Family Medicine (1).

The European Definition of General Practice/Family Medicine(1) was developed following the need for an authoritative statement which would define both the discipline of family medicine and the tasks of the family physician, and relate them to the context of the health care system (1). It defines six main competencies of family medicine: primary care management, person-centred care, specific problem-solving skills, comprehensive approach, community orientation and holistic modelling. Primary care management includes the ability to manage primary contact with patients, dealing with unselected problems; to cover the full range of health conditions; to co-ordinate care with other professionals in primary care and with other specialists; to master effective and appropriate care provision and health service utilisation; to monitor, assess and improve quality and safety of care; to make available to the patient the appropriate services within the health care system; and to act as an advocate for the patient. Person-centred care includes the ability to adopt a person-centred approach in dealing with patients and problems in the context of the patient's circumstances; to develop and apply the general practice consultation, so as to bring about an effective doctor-patient relationship, with respect for the patient's autonomy; to communicate, set priorities and act in partnership; to promote patient empowerment; and to provide longitudinal continuity of care as determined by the needs of the patient referring to continuing and co-ordinated care management. Comprehensive approach includes the ability to manage multiple complaints and pathologies, both acute and chronic health problems in the individual, simultaneously; to promote health and well-being by applying health promotion and disease prevention strategies appropriately; and to manage and co-ordinate health promotion, prevention, cure, care, palliation and rehabilitation. Community orientation includes the ability to reconcile health needs of individual patients with the community in which they live, in balance with available resources. Holistic approach includes the ability to use a bio-psycho-social model, taking into account cultural and existential dimensions.

Based on these competencies that every family physician should possess, the Educational Agenda lists, in broad terms, educational objectives of family medicine at different levels of training (2).

Usually, medical education is focused on studying diseases and their clinical management (3-5). Due to straightforwardness and rationality of such topics, they are usually relatively easy to teach using traditional teaching methods. On the other hand, medical education is also trying to teach more complex issues, namely comprehensive care, holistic care, multimorbidity, professionalism, ethical dilemmas, family functioning, communication in different situations, community orientation, etc. This requires adoption not only of knowledge and skills, but often also a change of attitudes of learners (4, 6), where traditional teaching methods are less likely to produce the expected results (6-9).

Cinemeducation is a relatively new method of medical education where movies or movie clips are used. In recent years, also television series on medical issues are being used in this context (10). Cinema utilises sight and sound, which enhance learners' ability of watching and listening. Moreover, movies stimulate discussions and reflections, which is a part of an active learning process (11). Cinemeducation is useful in teaching the bio-psycho-social-spiritual approach (12), especially the areas of communication, palliative care, ethical issues, professionalism, family dynamics and doctor-patient relationship (8, 11-14). This is achieved by engaging students in active learning, which is comparable to learning experienced during the actual consultations with patients (11).

Therefore, cinemeducation seems a very useful method of teaching a complex area of family medicine. Nevertheless, there are practically no studies that would go beyond the mere description of the topics and movies (11).

The aim of this study was to determine whether family physicians' competencies as listed in the Educational Agenda produced by the European Academy of Teachers in General Practice/Family Medicine (EURACT) (2), can be found in movies, and to propose a template for teaching by these movies. This exercise could then be repeated by different teachers interested in teaching family medicine by the use of cinemeducation.

2 METHODS

We asked a group of 41 family medicine teachers to provide us with a list of movies that they would use in cinemeducation. Movies were defined as recordings of moving images that tell a story and that people watch on a screen or television. We only included fictional and/or narrative movies and excluded documentaries and

television series. The latter were excluded because we wanted to ensure homogeneity of the methodology. We used full-length movies, but there were no other requests regarding the content, language, or country of production of the movies.

In the next step, the authors independently viewed the suggested movies and wrote a short synopsis of each, in which they described their usefulness for family medicine education. The evaluation was based on the learning outcomes of family medicine education proposed in the Educational Agenda (2). The movies were then categorized according to the key family medicine competencies by both authors independently. In practice, it meant that the authors looked for the scenes or clips of a particular movie that would stimulate the discussion and/or reflection upon at least one competency. Both authors afterwards discussed the findings and came to a mutual agreement. There were no disagreements between authors regarding the categorisation of movies.

The selection of movies was finished when the learning outcome of every competence was covered by at least five movies.

3 RESULTS

The list consisted of 17 movies.

Most of the movies covered more than one key competence. Table 1 shows the list of movies and their categorisation according to competencies. Table 2 shows which competencies were covered by which movies.

Table 1. The selected movies according to the category, key family medicine competency and key topic.

Movie (year, director)	The key family medicine competency	The key topics in the corresponding competence
4 Months, 3 Weeks and 2 Days (2007, Cristian Mungiu)	Person-centred care	Social and cultural dimension
	Community orientation	The effect of poverty on health care utilisation
50/50 (2011, Jonathan Levine)	Person-centred care	Understanding the patient's personality and life aims
Amour (2012, Michael Haneke)	Specific problem-solving skills	An approach to patients according to prevalence and incidence of diseases in a community
	Primary care management	Stroke
	Holistic approach	Holistic concept of care
As Good as It Gets (1997, James L. Brooks)	Person-centred care	Social and cultural dimension
	Community orientation	The effect of poverty on health care utilisation
	Comprehensive approach	Multimorbidity
	Primary care management	Obsessive-compulsive disorder Coordination of health services' utilization
Doc Hollywood (1991, Michael Caton-Jones)	Person-centred care	Continuous management of patients
	Specific problem-solving skills	Diagnosis and management of an emergency situation
	Comprehensive approach	The use of complementary and alternative medicine by patients
	Primary care management	Common conditions
Dr. T & the Women (2000, Robert Altman)	Person-centred care	Continuous management of patients
	Specific problem-solving skills	Uncertainty in medicine
	Comprehensive approach	Simultaneous management of acute and chronic conditions
	Primary care management	Gynaecological disorders
Once Upon a Time Was I, Veronica (2012, Marcelo Gomez)	Primary care management	Depression, anxiety, somatoform disorders
Hannah and Her Sisters (1996; Woody Allen)	Specific problem-solving skills	Irrational use of investigations
	Comprehensive approach	Consultation in family medicine
	Holistic approach	Holistic approach to communication
The Intouchables (2011, Olivier Nakache & Eric Toledano)	Person-centred care	Understanding the patient's personality and life aims
	Community orientation	Health care management of patients with special needs
	Comprehensive approach	Consultation in family medicine

Movie (year, director)	The key family medicine competency	The key topics in the corresponding competence
Steel Magnolias (1989, Herbert Ross)	Person-centred care	Understanding the patient's personality and life aims
	Primary care management	Diabetes
	Comprehensive approach	Multimorbidity
	Holistic approach	Holistic approach to communication
Stopped on Track (2011, Andreas Dresen)	Person-centred care	Patients' and their families' understanding of a disease
	Comprehensive approach	House visit
The Death of Mr. Lazarescu (2005, Cristi Puiu)	Community orientation	Health care organization and its effect on patients' management outcomes
	Primary care management	Epidural haematoma, abdominal pain, alcoholism Coordination of emergency services
	Specific problem-solving skills	Diagnosis and management of emergency situation
The Doctor (1991, Randa Haines)	Person-centred care	Communication
	Community orientation	Inequalities in health care provision
	Specific problem-solving skills	Step-wise decision-making
	Primary care management	Cancer Ill physician
	Holistic approach	
The King's Speech (2010, Tom Hooper)	Person-centred care	Person-centred communication Partnership building
The Last King of Scotland (2006, Kevin McDonald)	Person-centred care	Social and cultural dimension Communication Partnership building
	Specific problem-solving skills	Diagnosis and management of an emergency situation
	Primary care management	Epilepsy
	Holistic approach	Holistic concept of care
What's Eating Gilbert Grape? (1993, Lasse Hallström)	Person-centred care	Family-centred approach
	Holistic approach	Practical approach to holistic care
Wit (2001, Mike Nichols)	Person-centred care	Communication Partnership building
	Specific problem-solving skills	Ethics of history taking and clinical examination

3.1 Primary Care Management

Primary care management was covered in nine movies. They mainly focused on clinical topics or clinical dilemmas, and most of them narrated patients' experiences and their points of view. Some of them also described the coordination of care.

3.2 Person-Centred Care

Person-centred care was covered in 13 movies. Those movies depicted the relationship between the doctor and patient, building a partnership, communication, and continuous management of patients.

3.3 Specific Problem-Solving Skills

Specific problem-solving skills were covered in eight movies. The movies portrayed specific techniques and problem solving skills of family physicians.

3.4 Comprehensive Approach

Comprehensive approach was covered in five movies. The movies depicted doctors dealing with multiple complaints of a patient, health promotion, prevention and lifestyle issues.

3.5 Community Orientation

Community orientation was covered in five movies. The movies in this category described the influence of a disease on a community and family, and vice versa.

3.6 Holistic Approach

Holistic approach was covered in five movies. The movies portrayed comprehensive solutions to patients' problems that needed to include negotiations between biomedical solutions and social and cultural realities.

Table 1. The selected movies according to the category, key family medicine competency and key topic.

The main competency	Learning outcome	Movie (year, director)
Primary are management	To manage primary contacts with patients dealing with unselected problems	Doc Hollywood (1991, Michael Caton-Jones) The Last King of Scotland (2006, Kevin McDonald) The Death of Mr. Lazarescu (2005, Cristi Puiu) Once Upon a Time Was I, Veronica (2012, Marcelo Gomez) Steel Magnolias (1989, Herbert Ross)
	To cover the full range of health conditions	Amour (2012, Michael Haneke) Doc Hollywood (1991, Michael Caton-Jones) The Death of Mr. Lazarescu (2005, Cristi Puiu) Once Upon a Time Was I, Veronica (2012, Marcelo Gomez)
	To co-ordinate care with other professionals in primary care and with other specialists	Dr. T & the Women (2000, Robert Altman) The Death of Mr. Lazarescu (2005, Cristi Puiu)
	To master effective and appropriate care provision and health service utilisation	As Good as It Gets (1997, James L. Brooks)
	To make available to the patient the appropriate services within the health care system	The Doctor (1991, Randa Haines)
	To act as an advocate for the patient	Once Upon a Time Was I, Veronica (2012, Marcelo Gomez) The Death of Mr. Lazarescu (2005, Cristi Puiu)
Person-centred care	To adopt a person-centred approach in dealing with patients and problems in the context of the patient's circumstances	What's Eating Gilbert Grape? (1993, Lasse Hallström) The Last King of Scotland (2006, Kevin McDonald) 4 Months, 3 Weeks and 2 Days (2007, Cristian Mungiu) 50/50 (2011, Jonathan Levine) Intouchables (2011, Olivier Nakache & Eric Toledano) Stopped on Track (2011, Andreas Dresen) The Doctor (1991, Randa Haines)
	To develop and apply the general practice consultation, so as to bring about an effective doctor-patient relationship, with respect for the patient's autonomy	Wit (2001, Mike Nichols) Steel Magnolias (1989, Herbert Ross) As Good as It Gets (1997, James L. Brooks) The Doctor (1991, Randa Haines)
	To communicate, set priorities and act in partnership	The King's Speech (2010, Tom Hooper) 50/50 (2011, Jonathan Levine)
	To provide longitudinal continuity of care as determined by the needs of the patient, referring to continuing and co-ordinated care management	Dr. T & the Women (2000, Robert Altman) Doc Hollywood (1991, Michael Caton-Jones)
Specific problem solving skills	To relate specific decision making processes to the prevalence and incidence of illness in a community	Dr. T & the Women (2000, Robert Altman) Doc Hollywood (1991, Michael Caton-Jones) The Death of Mr. Lazarescu (2005, Cristi Puiu) Amour (2012, Michael Haneke)
	To selectively gather and interpret information from history-taking, physical examination and Investigations, and apply it to an appropriate management plan in collaboration with the patient	The Death of Mr. Lazarescu (2005, Cristi Puiu) Wit (2001, Mike Nichols)

The main competency	Learning outcome	Movie (year, director)
Specific problem solving skills	To adopt appropriate working principles (e.g., incremental investigation), using time as a tool and to tolerate uncertainty	The Doctor (1991, Randa Haines) Dr. T & the Women (2000, Robert Altman)
	To intervene urgently when necessary	Doc Hollywood (1991, Michael Caton-Jones) The Last King of Scotland (2006, Kevin McDonald) The Death of Mr. Lazarescu (2005, Cristi Puiu)
	To manage conditions which may present early and in an undifferentiated way	The Death of Mr. Lazarescu (2005, Cristi Puiu) Dr. T & the Women (2000, Robert Altman) The Doctor (1991, Randa Haines)
	To make effective and efficient use of diagnostic and therapeutic interventions	The Doctor (1991, Randa Haines) Dr. T & the Women (2000, Robert Altman) Hannah and Her Sisters (1996; Woody Allen)
Comprehensive approach	To manage multiple complaints and pathologies, both acute and chronic health problems in the individual, simultaneously	Steel Magnolias (1989, Herbert Ross) As Good as It Gets (1997, James L. Brooks) Doc Hollywood (1991, Michael Caton-Jones)
	To promote health and well-being by applying health promotion and disease prevention strategies appropriately	Hannah and Her Sisters (1996; Woody Allen) Steel Magnolias (1989, Herbert Ross) Dr. T & the Women (2000, Robert Altman)
	To manage and co-ordinate health promotion, prevention, cure, care, palliation and rehabilitation	Stopped on Track (2011, Andreas Dresen) As Good as It Gets (1997, James L. Brooks) Dr. T & the Women (2000, Robert Altman)
Community orientation	To reconcile health needs of individual patients and the community in which they live, in balance with available resources	As Good as It Gets (1997, James L. Brooks) The Death of Mr. Lazarescu (2005, Cristi Puiu) Intouchables (2011, Olivier Nakache & Eric Toledano) The Doctor (1991, Randa Haines) 4 Months, 3 Weeks and 2 Days (2007, Cristian Mungiu) The Death of Mr. Lazarescu (2005, Cristi Puiu)
Holistic approach	To use a bio-psycho-social model, taking into account cultural and existential dimensions	Amour (2012, Michael Haneke) What's Eating Gilbert Grape? (1993, Lasse Hallström) The Last King of Scotland (2006, Kevin McDonald) The Doctor (1991, Randa Haines) Steel Magnolias (1989, Herbert Ross)

4 DISCUSSION

To the best of the authors' knowledge, no study has dealt with the use of movies in teaching key competencies of family medicine (2) so far. In 2007, an article about using movies to teach Accreditation Council for Graduate Medical Education (ACGME) competencies was published (15). The article gives examples of a movie clip appropriate for teaching each of the six ACGME competencies, namely: Patient care, medical knowledge, practice-based learning and improvement, system-based practice, professionalism and communication (16). The article additionally described proposed methods and content areas in order to create a framework for teaching by cinemeducation. Other articles about cinemeducation already published usually offer a narrative view from an author that had used movies or movie clips in teaching, or in some way report on the feedback from learners engaged in cinemeducation (11).

In our study, similarly as in the aforementioned article (15), we used a theoretical framework as a basis for the

selection of movies. As we wanted to test the template of EURACT Educational Agenda (2) on the case of education with movies, we used a pragmatic method of selection of movies, based on trainers' opinions. The aim was not to make a reference list of movies that can be used in family medicine by cinemeducation, but to come up with a framework, which could be useful for teachers in their work. Therefore, many very good movies, widely used in education, were not listed.

This study showed that movies can be used in teaching all key family medicine competencies as described by the Educational Agenda (2).

Most of the movies included in our study covered more than one family medicine competence. These movies could be very useful in teaching family medicine, as the discipline itself is of a holistic and comprehensive nature. Topics, like family dynamics, holistic perception, comprehensive approach, continuous management of patients and person-centred approach are more difficult to teach when compared to clinical themes (7, 17, 18), and the use of movies could be a good addition to conventional teaching. It is understandable that movies cannot be used for teaching practical skills. However, as our study showed, they can be used to demonstrate their importance or to show the appropriate procedure.

Since family medicine is a very comprehensive discipline, it should not be taught by only one method. Our study aims to provide a template of how movies could be fitted into a framework of different teaching techniques of family medicine teaching.

Cinemeducation in family medicine can be used in different ways, and traditional classroom setting is probably not the best one. Since a lot of teaching of family medicine is done through a process of mentoring, discussions about movies may be a useful method of encouraging discussions with young learners and elucidating dilemmas of different kinds (19, 20). Teaching with movies gives students enough time to reflect on a situation they have seen, discuss about the problems with a supervisor, and find a solution which could help them were they facing similar problems in actual clinical work (8). It is interesting that we have found no descriptions of such use of cinemeducation. It is possible that the potential use of cinemeducation in teaching family medicine in one-to-one setting has been left to tutors' beliefs, without the use of a structured tool. The strength of this study is the use of a theoretical framework, such as the Educational Agenda (2). We chose not to perform the systematic search for appropriate movies, as we wanted to produce a model for teaching with movies that are available to teachers. Our list of movies serves only as a model for teaching and not as a proposed list of movies to be used in family medicine teaching. Teachers could use any movie (the content of which is appropriate for family medicine teaching) and employ it for teaching on the basis of EURACT Educational Agenda (2), together with their direction and moderation. The only criterion for the choice of an appropriate movie or movie clip is that it covers the teaching aims and that it stimulates discussion/reflection.

Our study has also some limitations. The first one is that only two teachers assessed the movies. Other teachers were only asked to provide a list of movies they thought to be appropriate for cinemeducation. The study would have a greater value if also those teachers provided analyses of suggested movies. Another limitation of the study pertains to the fact that we did not assess the usefulness of the movies for teaching, but were merely concerned with whether they are appropriate for teaching family medicine competencies according to the opinions of the teachers and authors. In addition, this study did not test the usefulness of this model in teaching, as no feedback from the teachers was sought. However, this study was only aimed at determining whether family physicians' competencies can be found in movies, and proposing a template for teaching by means of these movies.

We suggest that further studies assess the usefulness of this approach, and also examine where in the educational process movies could be successfully used.

5 CONCLUSIONS

This is the first attempt to use the EURACT teaching agenda to provide a systematic approach with an innovative teaching method. It suggested that cinemeducation can map across the different domains proposed in the Educational agenda, and vice versa. Therefore, any appropriate movie that covers at least one family medicine competence can be used in family medicine teaching. Our results can serve as a template for teachers on how to start selecting appropriate movies in the education of family medicine. Further studies are needed to determine the usefulness of such an approach in teaching and the extent of coverage of different areas of medicine in cinema.

CONFLICTS OF INTEREST

The authors declare that no conflicts of interest exist.

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ETHICAL APPROVAL

The study did not include any persons, so we did not seek ethical approval.

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THE PROFILING OF UNIVERSITY OF LJUBLJANA STUDENTS ACCORDING TO THEIR MOTIVES FOR EXERCISE PARTICIPATION

PROFILIRANJE ŠTUDENTOV UNIVERZE V LJUBLJANI GLEDE NA NJIHOV MOTIV ZA SODELOVANJE PRI ŠPORTNI VADBI

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ABSTRACT

Introduction. The main research objective is the analysis of the grouping of the students of the University of Ljubljana, with respect to the intensity of different types of exercise participation motives, their gender, discipline and year of study, level of physical activity, status of physical education class, organization of physical activities during study, and place of residence.

Methods. Data were collected using personal data sheets during enrolling students at the University of Ljubljana. Students completed The Exercise Motivations Inventory (EMI-2), with additional data about socio-demographic parameters.

Results. The results reveal that the students could be grouped in three distinctive clusters, which can be very clearly explained in terms of the prevalence of exercise participation motives in general. The students grouped in the first cluster have the lowest average values (means) in all exercise participation motives. The students grouped in the second cluster have the profile with moderate means in all exercise participation motives, while the students grouped in the third cluster have the profile with the highest means in all exercise participation motives.

Conclusion. The results indicate overall higher motivation for physical activity in men. All the sub-samples are different in their relevant features used in clustering (e.g., male students are dominant in life sciences, etc.), which provide a guide both for the explanation of the results obtained and for practical implications.

Keywords:
cluster analysis, motivation, university students, Slovenia

IZVLEČEK

***Uvod**. Glavni cilj raziskave je analiza razvrstitve udeležencev (študentov Univerze v Ljubljani) v skupine glede na intenzivnost njihovih motivov za sodelovanje pri športni vadbi na podlagi spola, vrste študija, letnika študija, stopnje telesne dejavnosti, statusa predmeta športne vzgoje med študijem, organizacije športnih dejavnosti med študijem in kraja bivališča.*

***Metode**. Podatki so bili zbrani na podlagi obrazcev, ki so vključevali osebne podatke. Le-ti so bili izpolnjeni ob študentovem vpisu na Univerzo v Ljubljani. Študenti so izpolnili vprašalnik o motivih za vadbo "Exercise Motivations Inventory" (EMI-2) z dodatnimi vprašanji, ki so obsegala 12 socio-demografskih parametrov.*

***Rezultati**. Rezultati kažejo, da lahko študente razvrstimo v tri skupine, ki jih je mogoče zelo jasno ločiti glede na prevladujoč motiv za sodelovanje pri vadbi na splošno (močno, srednje in šibko izraženi motivi). Študenti, uvrščeni v prvo skupino, imajo najnižje povprečne vrednosti pri vseh motivih za vadbo. Študenti, uvrščeni v drugo skupino, imajo profil s srednjimi vrednostmi, medtem ko imajo študenti, uvrščeni v tretjo skupino, najvišje motive za vadbo.*

***Zaključek**. Rezultati v splošnem kažejo na večjo skupno motivacijo fantov za športno dejavnost. Vendar pa se vsi pod-vzorci statistično razlikujejo glede na osebnostne lastnosti, ki smo jih uporabili pri razvrščanju v skupine (npr. moški študenti prevladujejo v naravoslovnih znanostih itn.). Ta podatek nas usmerja pri razlagi rezultatov in tudi pri njihovi praktični uporabi.*

Ključne besede:
analiza skupin, motivacija, študenti, Slovenija

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1 INTRODUCTION

Sports activity, regularly practiced, protects people against diseases and contributes to a better quality of life in the lifespan. In the curriculum of Physical Education (PE), children and young people could learn about the importance of movement, sport, fitness activities and a healthy lifestyle (1, 2). The course PE in higher education in Slovenia differs from the conceptions of those courses in primary and secondary schools, where PE is more clear defined in belonging curriculums.

The basic motives are supposed to be unconscious and they are hard to be recognized by the individual (3). Thus, weak motivation or lack of motivation appear when the individual is unaware of what drives and motivates him/her (4, 5). The lack of enjoyment in sports activities in an individual is often influenced by selecting activities unsystematically, following trends and without setting goals (6).

The motivational factors of each individual in physical education and organized sports activities should be strengthened, in order to ensure that the effects of these activities would be transferred to a student's life after graduation (7). However, the involvement in a sports activity during studies and later depends both on an individual's motivational structure (interests, attitudes, motives), and on the available conditions and opportunities in a certain environment (8).

The main motivational factors for students to engage in sports activities are health pressures, enjoyment, physical fitness, stress management and well-being (9-13). Gender differences in the motives for participating in sports activities are evident in several studies. Males and females differ in motives for participating in certain sports activities, having different interests in sport, training methods and unorganized sports activities (14). Gender differences are obvious in five motivational factors (affiliation, competition, weight management, rehabilitation and social recognition) (10). Primary factors which motivate men's participation in sport are competition, social interaction and health, while for women, the most important motives are: social contacts, competition and health (15). Men are more often motivated by internal factors (power, competition, challenge, fitness), while women are more frequently motivated by external factors (weight management, appearance) (16, 17). In all age groups, men show higher levels of general motivation and participation in sports than women do. For both genders, negative factors observed for non-engaging in sports activities are the lack of interest and limited time (15).

A current offer of sports activities at the University comprises of different sets of programmes, which differ in scope and in terms of quality, standards and purpose. The offer includes programmes of the Centre for University Sports (CUS), elective subjects of some members at the University of Ljubljana, programmes of competitive sports that take place under the auspices of the Sports Association of the University of Ljubljana (ŠZUL) and the Slovenian University Sports Association (SUSA), and programmes carried out under the auspices of the Institute for student sports at the Student Organisation of the University of Ljubljana (SOU sport). However, there is a strong negative trend in the proportion of students enrolled in regularly organized sports activities, since the start of the Bologna reform and the reorganization of sports activities at the University of Ljubljana. In other words, the abolition of compulsory Physical Education and the introduction of extracurricular sports activities at the University of Ljubljana have resulted in the drop in the share of students involved in organized sports activities on a regular basis (18). The University of Ljubljana offers organized sport activities that promote participation and socialization between groups and individuals, enhance physical fitness, and foster a spirit of fair play and sportsmanship. Each year, the content of activities varies according to the interests of students.

In this study, Slovenian high school and university students are grouped according to the prevalence of their motives in exercise participation, in relation to several socio-demographic features, engagement in physical activities, and relevant factors linked with institutional forms of organizing students' physical exercise. This taxonomisation should provide a platform for considering differences between educational programmes, adjusted to the characteristics of participants in certain taxa.

The profiling of students according to their motives for exercise participation is in line with their own and institutional efforts to enhance them. The insight in those profiles should provide the guidelines for a better and individually adjusted engagement of students in various physical exercise activities. The scope of this article is to offer a comprehensive description of those profiles.

The goal of this study is the analysis of the grouping of the participants according to the intensity of different types of motives for exercise participation, in relation to their gender, discipline of study, year of study, level of physical activity, status of physical education class during study, and organization of physical activities during study. The initial hypothesis was that students could be clearly categorized into several clusters (characteristic profiles) in terms of motives for exercise participation, according to abovementioned characteristics.

2 METHODS

2.1 Participants

The sample of participants included 5,271 students of the University of Ljubljana, which represents a 9.8 percent sample of the University of Ljubljana students in the 2010/2011 academic year. The age of the participants was between 19 and 42 years. Most students (25.6%) were enrolled in the first year of study. The data were collected by questionnaires distributed by e-mail to respondents. The data were collected on the basis of personal data sheets, completed when students were enrolling at the University of Ljubljana.

2.2 Procedure

We have disseminated questionnaires to 43,751 students of the University of Ljubljana (81.6% of all enrolled students). According to the instructions provided, 5,486 of them returned the questionnaires. In the study we considered the responses of 5,271 students – 2,033 male (38.5%) and 3,238 females (61.5%). Improperly completed questionnaires (215) were excluded from further processing. An email open rate of 15-20% is considered 'good', because we have expected the percentage of participants who respond to the survey to be even less than that. In other words, we emphasized that the participation in this research is voluntarily, and that drop out is acceptable even after a participant starts to fill in the questionnaire.

2.3 Instruments

In the study, we use the EMI-2 questionnaire (Exercise Motivations Inventory; Markland and Hardy) (19), which is widely employed in several studies of motivation. The EMI-2 was developed for assessing participation motives, in order to examine issues, such as the influence of motives on exercise participation, their influence on the choice of activities undertaken, how affective responses to exercise may be influenced by reasons for exercising, and how involvement in sports activities might have a reciprocal influence on participation motives. The authors developed an instrument to examine questions concerning functional significance of exercise motives from the perspective of Deci and Ryan's (20) self-determination theory. The EMI-2 comprises of 51 items that describe motives for participating in sports activities. A six-point Likert scale was used, in range from 0 ('not true at all') to 6 ('very true'). Moreover, we added 10 socio-demographic parameters to the EMI-2 (faculty, year of study, gender, age, engagement in sports activities, etc.). Factors that represent all scales of EMI-2 explained together 69.4% of the total variance (19).

2.4 Data Analysis

The data were analysed with the IBM SPSS Statistics (20.0) software. The basic descriptive characteristics were calculated (mean, standard deviation, the frequency of answers). Then, basic metric characteristics of the measuring instruments were determined (reliability and factor validity). The internal consistency of the 12 subscales was generally acceptable, with Cronbach's alpha reliability coefficients ranging from 0.63 to 0.90, while test-retest reliability coefficients over a 4-5-week period were ranged from 0.59 to 0.88 (19). In our research, reliability type internal consistency for the entire EMI-2 was 0.80, while the reliabilities for certain scales were: Stress Management (4 items; α=0.84); Revitalization (3 items; α=0.84); Enjoyment (4 items; α=0.93); Challenge (4 items; α=0.81); Social Recognition (4 items; α=0.85); Affiliation (4 items; α=0.88); Competition (4 items; α=0.94); Health Pressures (4 items; α=0.58); Ill-Health Avoidance (3 items; α=0.86); Positive Health (3 items; α=0.87); Weight Management (4 items; α=0.87); Appearance (4 items; α=0.93); Strength & Endurance (4 items; α=0.82); Nimbleness (3 items; α=0.83). Chi-square test is used to test the differences between students according to gender and discipline of study (life and social sciences), with all other relevant factors in research (label criteria for classification according to clusters obtained in research). K-means – i.e., non-hierarchical clustering method – is applied using quantitative (ratio-type) variables only, which represent types of exercise participation motives. Initial cluster centres are automatically determined, while three-cluster solution is estimated the most suitable. After clustering, with respect to the abovementioned quantitative variables (exercise participation motives), cases are classified in relation to: gender (male/female), discipline of study, year of study (1st, 2nd,…year), the level of physical activity (according to time used for physical activity, in the range from <30 minutes to >1000 minutes), status of physical education class during study (the status of PE program at the faculties: YES/NO) and organization of physical activities during study (available programmes of activities: YES/NO).

3 RESULTS

3.1 Differences in Socio-Demographic Characteristics

We analysed the differences among students according to two socio-demographic areas (gender and discipline of study).

According to the **discipline of study** (life/social sciences), more (n=2202, or 76%) female students are studying social sciences, while more (n=1341, or 56%) male students study life sciences (Chi square=581.95; df=1; p<0.001). More students in the first years of study are studying

social sciences (n=1761 or 61%) (Chi square=220.18; df=11; p<0.001). Students who are studying life sciences are more physically active (n=1316 or 55%) (Chi square= 31.36; df=1; p<0.001). Students who are studying life sciences attended more classes of physical exercise (n=1442 or 61%) (Chi square=32.39; df=1; p<0.001), while students who are studying social sciences attended organised physical activities for longer periods of time (with median 360-420 minutes per week) (Chi square= 27.88; df=11; p<0.01). Students who are studying life sciences and who have a stronger need for mandatory physical activities (n=1290, or 54%) (Chi square=7.77; df=1; p<0.01) spend longer periods of time participating in unorganised physical activities (with median 180-240 minutes per week) (Chi square=50.11; df=11; p<0.01).

When analysing **gender differences** among students, according to the discipline of study (all faculties), the results revealed that more female students (n=2202, or 76%) are engaged in social sciences (e.g., the Academy of music, the Academy of fine arts and design, the Biotechnical faculty, the Faculty of economics, the Faculty of architecture, the Faculty of social sciences, etc.) (Chi square=1419.34; df=22; p<0.001). Male students are prevalent at the Faculty of electrical engineering, the Faculty of civil and geodetic engineering, the Faculty of maritime studies and transport, the Faculty of computer and information science, and the Faculty of mechanical engineering (n=1341, or 56%). Female students are more often students (n=2367, or 74%) of lower years of study (Chi=36.66; df=11; p<0.001) and they are less physically active (n=1713, or 66%) during their studies than male students (Chi square=54.10; df=1; p<0.001). Male students attended more classes of physical exercise (n=1181, or 58%) (Chi square=4.10; df=1; p<0.05) and spent longer periods of time in organised physical activities (with median 300-360 minutes per week) (Chi square=101.03; df=11; p<0.001). Male students with a greater need for mandatory physical activities (n=1097 or 54%) (Chi square=4.33; df=1; p<0.05)spent longer periods of time performing unorganised physical activities (with median 180-240 minutes per week) (Chi square=215.01; df=11; p<0.001).

3.2 The Grouping of Students by their Motivations

The results of cluster analyses reveal that the students could be grouped into three distinctive clusters, which can be very clearly explained in terms of the prevalence of motives for exercise participation in general, namely: strongly, moderately and weakly expressed motives (Table 1). Students grouped in the first cluster have the lowest average values (means) in all exercise participation motives. The students grouped in the second cluster have the profile with moderate means in all exercise participation motives, while the students grouped in the third cluster have the profile with the highest means in all exercise participation motives (Table 1). The majority of students are classified into the second cluster (moderate motivation), while the minority of students are classified into the first cluster (weak motivation). Women are prevailing in the second cluster, while men are dominant in the third cluster (Table 1). Both male and female students are rarely represented in the first cluster. This grouping shows that male students in general have strongly emphasised all exercise participation motives, while both male and female students have moderately emphasised exercise participation motives (Table 1).

Table 1. Taxonomisation of Slovenian students' motives for sport and exercise by gender (K-means clustering).

Variables	Clusters		
	1	2	3
	weak motivation	moderate motivation	strong motivation
stress management	8.60	15.19	**16.56**
revitalisation	8.04	12.77	**13.40**
enjoyment	9.16	15.94	**17.88**
challenge	5.76	11.84	**15.98**
social recognition	2.25	4.31	**11.77**
affiliation	5.86	8.93	**14.49**
competition	2.58	3.11	**13.34**
health pressures	1.65	2.81	**4.80**
ill health avoidance	5.76	10.34	**10.86**
positive health	8.01	12.96	**13.27**
weight management	7.12	12.88	**13.21**
appearance	8.18	14.99	**15.68**
strength & endurance	8.62	15.09	**16.86**
nimbleness	7.46	11.97	**12.85**
Overall number of cases in each cluster	*1084*	*2319*	*1868*
Males	432	579	**1022**
Females	652	**1740**	846

According to their discipline of study, the results indicate that students of life sciences are prevailing in the second (almost equally) and in the third cluster, while students of social sciences are dominant in the second cluster (Table 2). Students of life and social sciences are very rarely represented in the first cluster. Students of life sciences in general have higher means in all exercise participation motives than students of social sciences, but all students are at least moderately physically active (Table 2). The most physically active students are found at the Faculty of economics, the Faculty of electrical engineering, the Faculty of civil and geodetic engineering, the Faculty of

Table 2. Taxonomisation of Slovenian students' motives for sport and exercise by the discipline of study (K-means clustering).

Variables	Clusters		
	1	2	3
	weak motivation	moderate motivation	strong motivation
Overall number of cases in each cluster	*1084*	*2319*	*1868*
Academy of theatre, film, radio and television	**6**	**4**	3
Academy of music	5	**9**	1
Academy of fine arts and design	5	**23**	6
Biotechnical faculty	45	**100**	73
Faculty of economics	133	339	**354**
Faculty of architecture	27	**65**	36
Faculty of social sciences	97	**244**	125
Faculty of electrical engineering	66	83	**147**
Faculty of pharmacy	25	**92**	50
Faculty of civil and geodetic engineering	36	72	**95**
Faculty of chemistry and chemical technology	32	62	**68**
Faculty of mathematics and physics	35	67	**74**
Faculty of maritime studies and transport	8	**21**	16
Faculty of computer and information science	64	75	**84**
Faculty of social work	33	**52**	10
Faculty of mechanical engineering	70	92	**168**
Faculty of sport	7	38	**105**
Faculty of administration	49	**111**	97
Faculty of arts	234	**495**	185
Faculty of medicine	27	**115**	71
Faculty of natural sciences and engineering	52	**81**	57
Faculty of education	23	**61**	40
Faculty of health sciences	5	**18**	3
Life sciences	492	**943**	**942**
Social sciences	592	**1376**	926

chemistry and chemical technology (the third cluster), while only the students from the Academy of theatre, film, radio and television are dominant in the first cluster.

When analysing the grouping of participants according to their year of study, the results indicate that only students in the 1st year, on the 1st level are prevailing in the third cluster, while students from all other years of study are relatively and absolutely dominant in the second cluster (Table 3).

Table 3. Taxonomisation of Slovenian students' motives for sport and exercise by the year of study (K-means clustering).

Variables	Clusters		
	1	2	3
	weak motivation	moderate motivation	strong motivation
Overall number of cases in each cluster	*1084*	*2319*	*1868*
1st year, 1st level	268	467	**476**
2nd year, 1st level	193	**356**	321
3rd year, 1st level	139	**314**	299
4th year, 1st level	93	**218**	136
5th year, 1st level	10	**39**	15
6th year, 1st level	2	**18**	6
1st year, 2nd level	60	**159**	102
2nd year, 2nd level	42	**98**	83
1st year, 3rd level	19	**40**	21
2nd year, 3rd level	24	**48**	26
3rd year, 3rd level	15	**33**	30
advanced university student	219	**529**	353

Students who do sports during their studies are prevailing in the third (and almost equally in the second) cluster, while students who do not do sports during their studies are dominant in the second cluster (Table 4). Students who have and those who do not have physical education classes during their studies are prevailing in the second cluster (but those who have physical education as a class have relatively more cases grouped in the third cluster). Students who have mandatory physical education classes are dominant in the third cluster, while those who do not have them are prevailing in the second cluster. Both students who have and those who do not have organised physical activities during their studies are prevailing in the second cluster (but those who do not have organised physical activities have fewer cases grouped in the third cluster).

4 DISCUSSION

The main finding of the research is the fact that students from Slovenian universities could be grouped into three distinctive clusters, which can be explained in terms of the prevalence of motives for exercise participation in general, namely: Strongly, moderately and weakly expressed motives for physical exercise. The minority of students have weak motivation (the first cluster), while the majority of students have moderate motivation (grouped in the second cluster). In the third cluster (the strongest all exercise participation motives) are grouped students who are mostly male, students of life sciences, very physically active during their studies and who have mandatory physical education classes during the studies. Stronger motivation in males is argued in the majority of previous studies (21). However, there are just a few opposite results: Women showed stronger motivation for participation in sports activities, comparing to men in the study of Gill et al. (22), while in some studies, gender appears as non-important for the type of motivation in males and females (23). The analysis of the differences in their important socio-demographic characteristics (gender and the discipline of study) revealed that students who study social sciences are more often females, students from lower years of study, who are less physically active, have fewer classes of physical exercise, and lower need for mandatory physical activity. Students who study life sciences showed the opposite trend. Gender differences are statistically significant in the discipline of study (the choice of universities). Relatively more female students are in lower years of the study, less physically active, have less classes of physical exercise, attend organised and unorganised physical activities for shorter periods of time, and demonstrate lower need for mandatory physical activity. Trends in male students for same variables are just opposite. The results of grouping of the participants could be mostly explained in terms of a higher level of general motivation and a higher level of participation in sports activities in men than in women, while the lack of interest in sports compared to other activities that request less effort and time could be reasons for non-engaging in sports activities(15). For example, younger generations probably prefer other types of fun and spending free time differently. On the other hand, women can be described as expressive, socially sensitive, and genuinely interested in other people (24, 25); they demonstrated greater perceptiveness, empathy, and adaptability than men (26), showing higher social and emotional intelligence (27). This could be reflected in reported higher motivation in women to stay in good shape than men (28), and women also prefer team sports to individual ones (29).

In fact, the analysis of the differences in both socio-demographic characteristics (gender and the discipline of study) indicated that the interaction between gender and higher (in men) or lower (in women) interest in physical activity in general, is also reflected in the choice of study (men more often choose life sciences, women social sciences). The most reasonable explanation could be that male students have higher level of general motivation and higher level of participation in sports activities than female students (30). However, the intensity of certain types of motivational factors depends on gender, the availability of physical exercise (i.e., specific programmes at certain universities), types of sports, and the level of sport engagement (in terms of sports excellence). In other words, there are differences in motivational factors between athletes who participate in competitive sports and those participating in all types of sports (31). The results of several studies reflect gender differences in the motives for participating in sports activities, found in motives for participating in certain sports activities, interest in sports, training methods (14), in five motivational factors (10, 15), internal factors and external factors (16, 17, 32). Hence, stimulating the students of social studies to be more engaged in sports could be 'translated' into stimulating female students to be more physically active (women are dominant in social studies). In the study conducted in Croatia (33), one of suggested ways to stimulate women's participation in sports is to hire women in various positions in sports as a solution (coaches, judges, tournament officials, members of sports club management, etc.). Adequate educational courses for with abovementioned positions of women and better media coverage of women in sport are prerequisites for a better inclusion of women in sport (33).

The advantage of the research is the examination of a current (actual), large and representative sample of students at the University of Ljubljana, with selected socio-demographic features, relevant for the purpose of this research. The limitations of the research arise from differences according to gender and discipline of study, which are reflected in groupings of participants. Moreover, in spite of a large sample of participants, only students from the University of Ljubljana were included in the research. Differences in students' relevant features used in clustering (e.g., male students are dominant in life sciences, etc.), provide a guide for practical implications. Information about the groupings of participants according to their exercise participation motives, offer a framework for planning educational programmes at the universities, as well as for health prevention programmes. It has to be pointed out that in Ljubljana, more and more sports events and sports activities are organised, even for free, and that in the last years, also many students participate in such events and activities. Moreover, many people are in the parks, running, skating or biking on the tracks, which gives more credit to the daily physical activity of students. In a wider

framework, as for the Ljubljana citizens, exercises (such as aerobics, Pilates and other recreational activities) are offered for very acceptable costs, out of PE contents and offers. Therefore, it is possible that this study does not reflect the 'real' situation about sports engagement amongst the University of Ljubljana students (including only PE lessons at the faculties).

The recommendation for future research can involve using more sophisticated statistical methods (for example, general linear model, with two-factorial or three-factorial MANOVA), as well as extending this investigation to students of different universities and faculties in different cities in Slovenia, or to the international level.

5 CONCLUSION

Slovenian university students could be grouped into three distinctive clusters. These clusters could be explained in terms of the prevalence of motives for exercise participation in general (strongly, moderately and weakly expressed motives). Male students, students who are studying life sciences, who are sport active during their studies, and those who have mandatory physical education classes during their studies are grouped in the third cluster, with the highest level of all exercise participation motives. To use the results obtained for practical purposes (designing particular programmes), it is important to consider the differences in socio-demographic variables. From a social standpoint, sports are a powerful tool that brings students together and creates a sense of community. They develop connections that bond together students from all the faculties. These relationships are essential for emotional and physical health throughout the entire period of the study.

CONFLICTS OF INTEREST

The authors declare that no conflicts of interest exist.

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There was no relevant financial interest in this article.

ETHICAL APPROVAL

The study was conducted in accordance with the code of Ethics of the World Medical Association (Declaration of Helsinki).

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EVALUATION OF NATIONAL FOOD AND NUTRITION POLICY IN ALBANIA
OVREDNOTENJE NACIONALNE PREHRANSKE POLITIKE V ALBANIJI

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ABSTRACT

Introduction. The paper aims to describe the progress that has been made in the implementation of the Albanian food and nutrition policy since 2003, so as to consider its impacts to date, and to identify strategic priorities/critical areas and priorities for Albania's future policy on improving the national food and nutrition situation.

Methods. In 2011-2012, an expert group applied an intersectoral participatory approach to evaluate the implementation of Food and Nutrition Action Plan 2003-08 in Albania. The experts employed the quantitative method, using a 9 question logical assessment matrix to measure the achievements of the individual goals of the Plan, and a qualitative tool for the interview of an interdisciplinary sample of 68-key informants-persons operating in public health nutrition, food safety and food availability related subfields, from a wide range of pertinent institutions and stakeholders.

Results. The quantitative and qualitative assessment revealed that the implementation process has faced serious barriers linked to the design of the plan, which did not accurately anticipate a theoretical framework, or structured methods for its implementation. Other impeding factors included the lack of institutional/ infrastructure support, lack of intersectoral coordination and motivation, as well as insufficient capacities and know-how. Intersectoral response to the multifaceted nature of double burden of malnutrition is of key importance to improve nutritional wellbeing and health outcomes in Albania.

Conclusion. Participatory approaches that involve all relevant sectors and actors in the development, monitoring and evaluation of the implementation of public health policies based on comprehensive action-oriented assessments are promising and should be further supported.

Keywords:
Albania, food, nutrition policy, implementation, assessment

IZVLEČEK

***Uvod**. Namen članka je opis napredka pri izvajanju prehranske politike v Albaniji od leta 2003, pregled vplivov prehranske politike do danes ter prepoznavanje strateških prednosti in kriznih področij za prihodnjo politiko Albanije pri izboljševanju prehranskega stanja v državi.*

***Metode**. Strokovna skupina je med letoma 2011 in 2012 izvedla medsektorski pristop s sodelovanjem za ovrednotenje izvajanja Akcijskega načrta za hrano in prehrano 2003-2008 (Food and Nutrition Action Plan 2003-08) v Albaniji. Strokovnjaki so uporabili kvantitativno metodo z uporabo logične ocenjevalne matrice z devetimi vprašanji, ki vrednoti dosežke posameznih ciljev v Načrtu ter kvalitativno orodje za namen intervjuja interdisciplinarnega vzorca 68 ključnih oseb, ki delujejo na področju javnega zdravja, prehrane, varnosti živil in podpodročjih, ki so povezana z razpoložljivostjo hrane - širok izbor med ustreznimi ustanovami in deležniki.*

***Rezultati**. Kvantitativno in kvalitativno vrednotenje je razkrilo, da so se med postopkom izvedbe pojavile resne ovire, ki so povezane z oblikovanjem načrta, ki ni ustrezno predvideval teoretičnih okvirjev ali strukturiranih metod za izvedbo. Ostali oviralni dejavniki so bili tudi pomanjkanje podpore s strani institucij in infrastrukture, pomanjkanje medsektorske koordinacije in motivacije kot tudi nezadostne kapacitete in znanje. Medsektorski odziv na večstransko naravo dvojnega bremena pri neustrezni prehranjenosti je ključna zadeva pri izboljševanju prehranske blaginje in zdravstvenih izidov v Albaniji.*

***Zaključek**. Pristopi s sodelovanjem, ki vključujejo vse pomembne dejavnike in akterje pri razvoju, nadzoru in ovrednotenju izvedbe politike javnega zdravja na podlagi celostne in akcijske ocene, so obetavni in jih je treba podpirati tudi v prihodnje.*

Ključne besede:
Albanija, hrana, prehranska politika, izvedba, ovrednotenje

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1 INTRODUCTION

There has been a significant progress in food and nutrition policy development across Europe in the past two decades. Despite this progress, most countries in the European region have, nevertheless, not achieved nutrition and dietary goals (1). Overall, a number of developments in global policy, research and guidance have contributed continuously to strengthening and supporting the implementation of food and nutrition policies across the countries (2-6).

However, the implementation of the policies continues to be a major challenge due to lack of funds, political commitment and coordination. Hence, more support should be given to the implementation and evaluation of policies, and a shift towards stronger environmental approaches is needed (7).

Following the endorsement of the First Action Plan for Food and Nutrition Policy for the WHO European Region 2000–2005 (3), an intersectoral working group with representatives from health, agriculture, tourism, education, environment, economy, labour and social affairs, finance, as well as other governmental institutions, developed the Albanian Action Plan for Food and Nutrition 2003-2008 (AAPFN), signed by the Prime Minister in July 2003 (8). The adoption of the AAPFN 2003-2008 by the government provided the basis for political commitment and regulatory entry point for all public institutions to translate the policy into actions in the field of food and nutrition in Albania. However, there is little published evidence about this event. The AAPFN aimed at reducing the level of foodborne diseases, protecting and promoting health, and putting public health at the heart of food policy.

The purpose of this paper is to describe the progress that has been made in the implementation of the AAPFN since 2003 – what has been achieved and what remains to be done – to consider its impacts to date, and to identify strategic priorities/critical areas and priorities for Albania's future policy on improving the food and nutrition situation in Albania.

2 METHODS

The evaluation expert group applied an intersectoral participatory approach involving, in addition to the review of existing documents and data, qualitative and quantitative methods. The same methodology was applied as for the evaluation of the implementation of the Slovenian Food and Nutrition Policy 2005-2010 (ReNPPP 2005-10) (9).

The intersectoral expert group employed the quantitative method using a 9 question logical assessment matrix (Table 1), with nine evaluations grades (Table 2) (9), to measure the achievements of the individual (re-shaped) goals of the AAPFN 2003-2008

Table 1. A nine question logical assessment matrix (9).

Q 1: Has there been enough evidence produced to set priorities for the individual goal?
Q 2: Were appropriate measures proposed for the individual goal?
Q 3: Were proposed measures adopted?
Q 4: Were adopted measures implemented?
Q 5: Were social inequalities tackled by proposed measures?
Q 6: Was at least 50% of the target population reached by the measure?
Q 7: Were sufficient financial resources provided for the implementation?
Q 8: Were strategic aims of the FNAP in line with implementation goals?
Q 9: Were implementation activities in line with the individual goal?

Table 2. Criteria for evaluation (9).

Considerable success (+)	(4.8-5)
Considerable/moderate success	(4.3-4.7)
Moderate success (+/0)	(3.8-4.2)
Moderate/little success	(3.3-3.7)
Little success (0)	(2.8-3.2)
Little/minimal success	(2.3-2.7)
Minimal success (0/-)	(1.8-2.2)
Minimal/no success	(1.3-1.7)
No success (-)	(1.2 and less)

The National Institute of Public Health conducted the qualitative assessment exercising a tool (9) with 36 closed questions with open space to express opinions, for the interview of an interdisciplinary sample (9) of 68-key informants-persons operating in public health nutrition, food safety and food availability related subfields, from a wide range of pertinent institutions and stakeholders. In total, 60 interviews were carried out.

2.1 Data Analysis

The intersectoral expert group estimated the achievement of individual goals calculating the average score for each goal (9) of the AAPFN 2003-08, as per the abovementioned criteria.

The processing of 60 completed questionnaires used a specially designed database and translated the questions or fields in the questionnaire into 87 variables during the analysis. Statistical Package for Social Sciences (SPSS, version, 17.0) was used for the analysis of quantitative data, whereas most of the analysis concerning the qualitative information applied horizontal qualitative techniques.

The expert group prepared a detailed analysis of the assessments conducted, recommendations included. One large intersectoral group discussed and agreed upon the recommendations for the future nutrition policy in Albania.

The authors aggregated the findings of this process.

2.2 Validation

The 'methodology' workshop (9), including a training session on quantitative methodology, was held in October 2011. Workshops sharing results were held in March and July 2012.

3 RESULTS

The APFN 2003-2008 addressed a food safety pillar through the fulfilment of four (reshaped) goals and a nutrition pillar through the fulfilment of eleven (reshaped) goals (Table 3).

Table 3. Estimation by pillars[1].

	Research data available, with priorities Q1 (5.0)	Measures were Proposed Q2 (3.9)	Measures were Adopted Q3 (3.8)	Measures were Imple-mented Q4 (3.5)	Social inequalities were tackled by the measure Q5 (4.4)	At least 50% of the Target Population was reached by the	Sufficient financial Resources were Provided Q7 (3.4)	Goals are in line with The strategic aim of	Imple-mented Activities are in line with the goals Q9 (4.6)
FOOD SAFETY (3.8)	**5.0**	**3.1**	**3.8**	**3.3**	**NA**	**NA**	**3.3**	**4.3**	**4.3**
1. Harmonising the legislation with the EU (4.8)	5.0	4.5	5.0	4.5	NA	NA	4.5	5.0	5.0
2. The improvement of food safety control and the establishment of SS (3.6)	5.0	3.0	3.0	3.0	NA	NA	3.0	4.2	4.2
3. Strengthening food control laboratories (2.7)	5.0	2.5	2.0	1.8	NA	NA	1.8	3.0	3.0
4. Strengthening technical capacities (4.1)	5.0	2.5	4.0	3.8	NA	NA	4.0	5.0	5.0
NUTRITION (4.2)	**5.0**	**4.6**	**3.9**	**3.7**	**4.4**	**3.4**	**3.4**	**4.9**	**4.8**
1. The prevention of malnutrition among women: adolescence pregnancy lactation (4.1)	5.0	3.7	3.7	3.7	5.0	3.0	3.5	4.7	4.7
2. Preserving the tradition of breastfeeding, and timely initiation of complementary feeding (4.3)	5.0	4.3	4.1	3.1	4.9	3.9	4.0	5.0	5.0

[1] Results are presented in the template generated for the evaluation of the implementation of the Slovenian Food and Nutrition Policy 2005-2010 (ReNPPP 2005-10) (9).

	Research data available, with priorities Q1 (5.0)	Measures were Proposed Q2 (3.9)	Measures were Adopted Q3 (3.8)	Measures were Imple-mented Q4 (3.5)	Social inequalities were tackled by the measure Q5 (4.4)	At least 50% of the Target Population was reached by the	Sufficient financial Resources were Provided Q7 (3.4)	Goals are in line with The strategic aim of	Imple-mented Activities are in line with the goals Q9 (4.6)
3. The evaluation of the mode of nutrition (4.0)	5.0	5.0	4.0	3.1	2.6	2.9	3.3	5.0	5.0
4.The evaluation of the nutritional status of the population (4.9)	5.0	5.0	5.0	5.0	5.0	4.6	4.3	5.0	5.0
5. Determining main risk factors for nutrition-related diseases (4.3)	5.0	5.0	4.2	4.0	4.6	2.8	3.2	5.0	5.0
6. The eradication of iodine deficiency in the Albanian population (4.7)	5.0	5.0	5.0	4.9	4.9	4.1	3.9	4.9	4.9
7. Anaemia prevalence assessment and the prevention of IDA (4.0)	5.0	4.6	3.3	3.1	4.9	3.6	2.2	5.0	4.3
8. The improvement of oral health (3.8)	5.0	4.4	3.3	2.7	3.7	3.0	3.8	4.4	4.4
9.The establishment of a national network for M&E of the nutritional status of the population (4.2)	5.0	5.0	3.2	4.0	5.0	2.5	3.5	5.0	5.0
10. Managing the nutritional education, informing the population on a healthy nutrition and healthy lifestyle (3.7)	5.0	3.9	3.3	2.9	3.4	3.0	2.3	4.9	5.0
(i) The compilation of Recommendations for a healthy nutrition and healthy lifestyle (3.9)	5.0	4.3	3.7	2.7	4.0	3.3	2.3	5.0	5.0
(ii) The preparation of inter-sectorial promotional interventions (4.1)	5.0	4.1	3.7	3.7	4.1	3.9	3.1	4.7	5.0

	Research data available, with priorities Q1 (5.0)	Measures were Proposed Q2 (3.9)	Measures were Adopted Q3 (3.8)	Measures were Imple-mented Q4 (3.5)	Social inequalities were tackled by the measure Q5 (4.4)	At least 50% of the Target Population was reached by the	Sufficient financial Resources were Provided Q7 (3.4)	Goals are in line with The strategic aim of	Imple-mented Activities are in line with the goals Q9 (4.6)
(iii) Strengthening intellectual potential on nutrition (3.2)	5.0	3.2	2.6	2.4	2.0	1.8	1.6	5.0	5.0
11.The improvement of legislation for the improvement of a nutrition-related health status (4.7)	5.0	5.0	3.8	4.5	4.6	4.5	4.5	5.0	5.0

Food security component was not addressed specifically compared to two other pillars of this Plan, namely: food safety and nutrition. Thus, it neither elaborates specific goals and measures nor does it identify the resources needed to implement any action related to food security. Regarding the adequacy and consistency of the way this policy document addresses food safety pillar, the evaluation showed the highest level of availability of evidence to set priorities for the respective goals, the food safety implementation goals aligned with strategic aims and the same as the implementation activities with the individual goals, but small appropriateness related to the measures proposed for the food safety individual goals.

The evaluation revealed that the food safety measures proposed by the Plan were adopted moderately, and that the food safety measures adopted were implemented partially successfully. The financial resources for their implementation, quantified through perceptions of key informants, were evaluated as partially sufficient.

With regard to the implementation of food safety individual goals, the evaluation revealed that 'the improvement and harmonization of food safety legislation with the European Union' was implemented successfully; moreover, 'strengthening food safety technical staff capacities at the central and regional level' was implemented moderately successfully; in addition, 'the improvement of food safety control system and the establishment of a surveillance system' was implemented partially successfully, whereas the goal of 'strengthening and increasing the level of food control laboratories, in health, agriculture and food systems' was implemented very partially successfully.

Table 4. Findings from the logical evaluation matrix[2].

		FOOD SAFETY	NUTRITION
	The number of goals	4	11
	Average assessment	Moderate	Moderate
1	**No success (%)**	0	0
2	**Minimal/no success (%)**	0	0
3	**Minimal (%)**	0	0
4	**Little/Minimal (%)**	25	0
5	**Little (%)**	0	0
6	**Moderate/little (%)**	25	9
7	**Moderate (%)**	25	46
8	**Considerable/moderate (%)**	0	36
9	**Considerable (%)**	25	9
	TOTAL	100%	100%

The evaluation found the overall implementation of the food safety strategic goals of the AAPFN 2003-08 moderately successful (Table 4).

Regarding the adequacy and consistency of the way the AAPFN 2003-08 documents address nutrition pillar, the evaluation found a very high level of the availability of evidence to set priorities for relative goals, nutrition implementation goals very aligned with strategic aims and the same as the implementation activities with the individual goals. The evaluation revealed that the measures for nutrition individual goals were appropriately proposed, and that social inequalities were tackled by them sufficiently. The evaluation revealed that the nutrition measures proposed by the Plan were adopted moderately, that the nutrition measures adopted were

[2] Results are presented in the template generated for the evaluation of the implementation of the Slovenian Food and Nutrition Policy 2005-2010 (ReNPPP 2005-10) (9).

partially implemented, that the coverage by them of at least 50% of target population was partially achieved, and that the financial resources provided for their implementation were partially sufficient.

With regard to the implementation of nutrition individual goals, the evaluation revealed that 'the evaluation of the nutritional status of the population" was likely to be implemented very successfully, whereas the goals of 'preserving the tradition of breastfeeding, exclusive breastfeeding and providing timely initiation of complementary feeding, 'determining main risk factors for nutrition-related diseases, 'the eradication of iodine deficiency in the Albanian population,' and 'the improvement and strengthening of legislation for the improvement of health status due to a better nutrition' were considered to be implemented successfully.

'Managing the nutritional education, informing the population on a healthy nutrition and healthy lifestyle' was estimated to be implemented partially successfully.
The evaluation found the overall strategic nutrition goals of the AAPFN 2003-08 implemented 'moderately' successfully (Table 4).

Regarding knowledge sharing process of the AAPFN 2003-08 after its adoption, only 55% of key informants interviewed had a good or relatively good knowledge about the APFN and, among them, the majority worked in central institutions and came from the health sector, compared to agriculture, education, culture, tourism, youth, sport, work, social welfare, finances and civic society sectors, producers and private enterprises. The lack of the systematic exchange of information among different management levels within a sector and among different sectors was identified as the main cause of not having enough knowledge on the Plan.

Regarding the extent of the influence the AAPFN had on improving the situation, respondents thought that the Plan had contributed more to the increased consumption of fruits and vegetables than to the reduction of food-borne diseases and obesity.

There seemed to be an almost complete consensus among key informants interviewed regarding the successfulness of the implementation of three main nutrition goals, namely: (i) support and promotion of breastfeeding; (ii) established health education programs for pregnant and postpartum women, and (iii) improved availability of health beneficial foods and healthy nutrition.

The main types of implemented actions mentioned by key informants included informing and educating the media, consumers, whole population, mothers, school-aged children, teaching staff, private enterprises for specific issues (such as iodized salt) and health professionals in particular; the enlargement of the network of baby-friendly maternity-hospitals; the development of Albanian Guidelines for a Healthy Nutrition; population nutritional status monitoring with the focus on the childbearing-age of women and children; preparing bylaws and improving legislation in the field of food and nutrition along with the harmonization of the respective legislation with the EU framework; food safety capacity building and food safety inspection and monitoring activities.

Regarding the employment of the participatory multisectoral approach during the implementation of AAPFN activities, the respondents from the Ministry of Health and Ministry of Agriculture, Food and Consumer Protection, in 72% and 63%, respectively, declared that they, in general, frequently collaborate with other ministries. This collaboration is likely to be more between these two ministries than between each of them and others. There seem to be somehow more positive opinions related to the level of collaboration with the Ministry of Education and Science, while regarding other ministries, according to key informants, there seems to be consistently scarce or absent collaboration. Collaboration with the Ministry of Finance and the Ministry of Culture, Tourism, Youth and Sports is reported to be at very low levels.

Regarding other institutions, the respondents' collaboration is likely to be better with the public health authorities, media, NGOs, health centres and education institutions, and less frequent with professional institutions, faculties, food industries, while respondents report that their collaboration with chambers of commerce is insignificant. A significant number of respondents think that the AAPFN has not been very effective in supporting the communication, especially with the public and other actors outside the public system (target groups, civil society organisations, etc.). It seems that the plan had been mostly effective in facilitating communication among professionals from the same sector.

Difficulties or barriers encountered during the implementation of the Plan, identified by a large number of respondents, were related to:

- Designing the plan: Most of the objectives of the plan were relatively clear and feasible, but detailed descriptions of the actions, the responsible actors, implementers and the time frame were often missing; in some cases, objectives and measures were very general and not measurable; estimated costs for the implementation and prioritisation of actions were missing too; the plan was also lacking an integrated plan for monitoring and the evaluation of the effectiveness of proposed objectives and activities.
- Time and energy was lost due to frictions among different sectors and institutions.
- There was a shortage of institutional and infrastructural support, in particular, there was lack of a national body responsible for the implementation

and coordination of activities of the nutrition policy and insufficient capacities and 'know how' at the central and local level.
- There were difficulties related to the population's nutrition habits and resistance to behavioural changes.

Among factors which could help the implementation of food and nutrition policies, the key informants consider: firstly, the awareness of professionals and the public; secondly, the collaboration with other sectors; and thirdly, financial support.

The prioritised recommendations/actions for the future nutrition policy in Albania, according to the key informants, were as follows:

- Exercising regular inspection measures over the energy and nutritional value of school and nursery school meals.
- Integrating healthy nutrition-related topics into school curricula.
- Installing water fountains in schools and nursery schools.
- Integrating measures in the field of nutrition with measures in the field of physical activity.
- The establishment of a cross-sector body in the field of food supply/food safety/nutrition.
- The preparation of specific measures to limit the trend of obesity.
- Increasing the encouragement of farmers to sell food in the local environment.
- Restricting the marketing of unhealthy foods to children.
- Supporting measures to improve the diet of socially disadvantaged groups.
- Reducing the taxation of fruits and vegetables.

4 DISCUSSIONS

The AAPFN 2003-08 was the main strategic policy, providing the basis for political commitment, and enabling public health and non-health institutions to transfer policy into action in the fields of food and nutrition in Albania. This Plan created and supported a policy environment that placed more emphasis on food safety and nutrition than on food security. In this sense, the Plan provides only a vague guidance for integrating some aspects of food security in developmental programs, while it does not point out activities at the macro and specific level for respective sectors and institutions. There is a lack of actions addressing the macro environment (food supply sector, urban planning and transport) through accessibility, affordability and availability.

Despite the overall progress over the last decade in improving the food and nutrition situation, legal and institutional frameworks, research and evaluation activities, and public awareness, Albania is still facing multiple nutrition-related problems. Albania is currently facing the double burden of malnutrition, including high rates of stunting (19 %) and overweight among children under 5 years (22%), disparities in health and nutrition status and micronutrient deficiencies (10), and a burden of Non Communicable Diseases (NCD) with an increasing trend (11). A current analysis revealed that actions were not being implemented on a regular basis and nationally, and that they were not tailored to the current dynamics of the food system (price, availability and accessibility of food) and marketing pressure that addresses the demand for food in a completely different direction from what the dietary guidelines indicate (7). This cannot be achieved by the health sector on its own; it requires the involvement of different sectors of the government as well as different stakeholders in the society (12). The AAPFN 2003-08 did not create a supportive environment to facilitate the fulfilment of health and nutrition objectives with the contribution of all sectors. The information on the implementation and effectiveness of specific interventions of the AAPFN 2003-08 was not available. The analysis showed that the document includes neither detailed implementation plans and respective financial implications nor mechanisms and tools to evaluate the implementation.

Regardless of the engagement of different stakeholders in the APFN 2003-08 formulation, the lack of effective collaboration among different sectors and institutions acted as a barrier for the implementation of this plan. The APFN 2003-08 did not clearly define the responsible ministries and task performers, which could support the implementation of actions, and it did not explicitly foresee the establishment of any specific administrative structure/body responsible for the implementation and coordination of activities of this food and nutrition policy. The presence of a national coordination body, such as a food and nutrition council, allows governments to develop, implement, monitor and evaluate nutrition policies, guidelines and action plans (7).

The evaluation methodology (9) used in Albania, helped us to show a similar multifaceted nature of the food and nutrition as in Slovenia, where the methodology was developed. So, the key common findings were the need for (i) an intersectoral response, involving the design and implementation of food and nutrition policies; (ii) systematically including evaluation and monitoring mechanisms and tools in the policy document; (iii) having in place a food and nutrition policy intending to achieve its primary objectives through influencing other public policy measures.

4.1 Study Limitations

This analysis was limited to the AAPFN 2003-2008 document and interviewing of 68 key informants, and additional information obtained from recent publications, various web-sites of national health ministries and health agencies. Although the sample of key informants had a multisectoral representation centrally and locally, it remains a purposive sample that does not allow extrapolating the findings on knowledge over the AAPFN 2003-2008 in all relevant executives and professionals in the country. However, the main purpose of the assessment was to help analyse the appropriateness of the plan designation and gaps or weaknesses during its implementation through a multisectoral participatory identification of key deficiencies and relevant actions to address them.

5 CONCLUSIONS

The comprehensive, participatory assessment of the Action Plan for Food and Nutrition (APFN) 2003-2008 created an evidence base for the development of the new food and nutrition policy more responsive to food and nutrition situation in Albania. The institutional intersectoral response to the multifaceted nature of a double burden of malnutrition is essential to improve nutritional wellbeing and health outcomes in Albania.

The main lesson drawn from this process was that 'policy makers should develop implementation strategies that explicitly take account of financial, managerial and technical aspects of the policy (capacity) and the anticipated resistance and support from all the actors in the subsystem within and outside government, to avoid the gap between policy expectation and reality' (13).

Albania case study has shown that in spite of a very demanding evaluation of the national policy, the methodology used in this study (9) can be transposed from one country (Slovenia) to another (Albania). It has the 'potential' to be used to evaluate the implementation of other public policies in other contexts and sectors with some respective adaptations. Therefore, this study is a contribution to future endeavours to advance the methodologies for the evaluation of the implementation of complex national policies.

CONFLICTS OF INTEREST

None declared.

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ETHICAL APPROVAL

A verbal informed consent from the Directory of Public Health at the Albania Ministry of Health allowed us to conduct the assessment in question with an intersectoral working group, consisting of representatives from the Ministry of Health and Ministry of Agriculture, Food and Consumer Protection, while the WHO provided technical assistance with the assessment methodology.

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LONGEVITY IN SLOVENIA: PAST AND POTENTIAL GAINS IN LIFE EXPECTANCY BY AGE AND CAUSES OF DEATH

DOLGOŽIVOST V SLOVENIJI: PRETEKLO IN PRIHODNJE PODALJŠEVANJE ŽIVLJENJSKEGA PRIČAKOVANJA PO STAROSTI IN VZROKIH SMRTI

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ABSTRACT

Introduction. In Slovenia, longevity is increasing rapidly. From 1997 to 2014, life expectancy at birth increased by 7 and 5 years for men and women, respectively. This paper explores how this gain in life expectancy at birth can be attributed to reduced mortality from five major groups of causes of death by 5-year age groups. It also estimates potential future gains in life expectancy at birth.

Methods. The importance of the five major causes of death was analysed by cause-elimination life tables. The total elimination of individual causes of death and a partial hypothetical adjustment of mortality to Spanish levels were analysed, along with age and cause decomposition (Pollard).

Results. During the 1997–2014 period, the increase in life expectancy at birth was due to lower mortality from circulatory diseases (ages above 60, both genders), as well as from lower mortality from neoplasms (ages above 50 years) and external causes (between 20 and 50 years) for men. However, considering the potential future gains in life expectancy at birth, by far the strongest effect can be attributed to lower mortality due to circulatory diseases for both genders. If Spanish mortality rates were reached, life expectancy at birth would increase by more than 2 years, again mainly because of lower mortality from circulatory diseases in very old ages.

Discussion and conclusions. Life expectancy analyses can improve evidence-based decision-making and allocation of resources among different prevention programmes and measures for more effective disease management that can also reduce the economic burden of chronic diseases.

Keywords:
longevity, life tables, mortality, causes of death, cause elimination, age decomposition, potential gains in life expectancy, life expectancy at birth, Slovenia

IZVLEČEK

Uvod. *V Sloveniji se življenje hitro podaljšuje. V obdobju od leta 1997 do leta 2014 se je pričakovano trajanje življenja ob rojstvu podaljšalo za 7 let za moške in za 5 let za ženske. V članku ugotavljamo, koliko je k temu povišanju v Sloveniji do leta 2014 prispevalo zniževanje umrljivosti po petih glavnih skupinah vzrokov smrti in po posameznih starostnih razredih. Poleg tega v članku ocenjujemo tudi potencialno bodoče podaljšanje pričakovanega trajanja življenja ob rojstvu za Slovenijo.*

Metode. *Uporabili smo skrajšane tablice umrljivosti s petletnimi starostnimi razredi. Razčlenitev podaljševanja pričakovanega trajanja življenja ob rojstvu v posameznih starostnih razredih smo analizirali po prirejeni Pollardovi metodi. Znotraj posameznega starostnega razreda smo posamezni skupini glavnih vzrokov smrti (bolezni obtočil, novotvorbe, zunanji vzroki smrtnosti, bolezni dihal, bolezni prebavil) pripisali enak relativni vpliv na povišanje pričakovanega trajanja življenja, kot ga ima ta vzrok smrti na znižanje stopnje smrtnosti v tistem starostnem razredu. Potencialen prispevek posameznega vzroka smrti na podaljšanje pričakovanega trajanja življenja v prihodnosti smo analizirali s tablicami smrtnosti z izločenim posameznim vzrokom smrti. Ker je popolna izločitev posameznega vzroka smrti nerealistična, smo upoštevali tudi hipotetično prilagoditev stopenj smrtnosti na raven Španije, ki ima najdalje pričakovano trajanje življenja ob rojstvu v EU in je po dejavnikih tveganja za glavne skupine vzrokov smrti podobna Sloveniji.*

Ugotovitve. *V obdobju 1997-2014 je imelo največji vpliv na podaljševanje pričakovanega trajanja življenja zmanjševanje smrtnosti zaradi bolezni obtočil v starosti nad 60 let pri obeh spolih. Pri moških je močno vplivala tudi nižja smrtnost zaradi novotvorb v starosti nad 50 let ter zaradi zunanjih vzrokov smrti v starosti med 20 in 50 let. Pri analizi potencialnega povišanja pričakovanega trajanja življenja smo ugotovili, da bi lahko največ pridobili z zniževanjem smrtnosti zaradi bolezni obtočil. Do podobnega sklepa pripelje prilagoditev stopenj smrtnosti v Sloveniji na ravni, ki jih ima Španija. Pričakovano trajanje življenja ob rojstvu bi bilo v tem primeru višje za več kot 2 leti, pri čemer bi največ razlike ponovno prispevali najvišji starostni razredi z nižjo smrtnostjo zaradi bolezni obtočil in novotvorb, precej pa tudi moški vseh starosti zaradi zunanjih vzrokov.*

Razprava in sklep. *Analiza pričakovanega trajanja življenja po vzrokih smrti in starosti omogoča z dokazi podprto odločanje o razporejanju resursov med različne preventivne programe in programe obvladovanja bolezni.*

Ključne besede:
dolgoživost, tablice umrljivosti, umrljivost, vzroki smrti, razčlenjevanje po starosti, potencialno podaljšanje življenjskega pričakovanja, Slovenija

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1 INTRODUCTION

In developed countries, a major outcome of fertility decline and increased longevity is population ageing that holds important implications for labour markets, social security, healthcare systems, and related developmental strategies. Currently, however, many countries are undergoing a different demographic transition (1). Given that in developed countries the biggest gains in life expectancy are realised at older ages (1, 2), such countries are examining these gains' policy implications.

The literature addressing gains in life expectancy can be placed in three broad groups. The first comprises numerous studies of life expectancy gains arising from specific medical interventions and innovations. The second group studies the relationship between risk factors and life expectancy but, given the complexity of this relationship, either the impact of a specific risk factor on different causes of death is investigated (3-5), or different risk factor modifications for a specific disease are observed (6-7). The third group investigate the impact of the major causes of death on life expectancy, often combined with decomposition by age (8-11).

This paper contributes to the third group of papers. The key motivation for this research is to build on the results for Slovenia shown in recent literature (10), where only aggregate estimations are provided. In 2015, a very influential paper looking at global, regional and national age-sex specific all-cause and cause-specific mortality was published (11). While studying the epidemiological convergence across countries, the decomposition of life expectancy showed the prominent role of reductions in age-standardised death rates for cardiovascular diseases and cancers in high-income regions, and reductions in child deaths from diarrhoea, lower respiratory infections, and neonatal causes in low-income regions. Because Slovenia is only briefly mentioned, our paper's main goal is to provide a more detailed analysis of the main triggers for past and future potential improvements in life expectancy at birth. More specifically, we try to confirm that the mortality improvement pattern – whereby the biggest gains are achieved in older ages due to fewer cardiovascular diseases and cancers – also holds for Slovenia, implying that Slovenia, too, is in the "cardiovascular revolution" stage of epidemiological transition (12).

This paper therefore investigates longevity improvement in Slovenia between 1997 and 2014, for which detailed data are available. During this period, life expectancy at birth e_0 increased by 7.0 and 5.0 years for men and women, respectively. Assuming the mortality pattern from 2014, e_0 equals 78.2 years for men and 84.1 years for women. The e_0 increase was particularly fast between 2004 and 2014, that is 4.6 years for men and 3.3 years for women. As also shown by Figure 1, the increase is more pronounced for men. Figure 1 reveals the increase in e_0 in Slovenia was larger than in the EU-28 area, respectively 2.9 and 2.1 years for men and women.

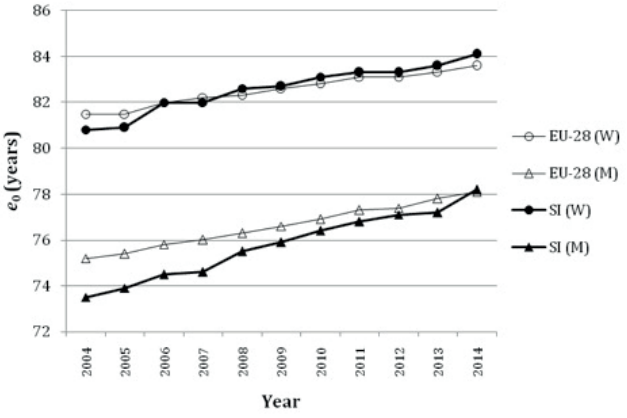

Figure 1. Life expectancy at birth for men (M) and women (W), 2004–2014, Slovenia (SI) and EU-28 (13).

Eurostat's latest population projections for Slovenia assume a further rise in e_0 (14). Technically, e_0 is most strongly influenced by preventing infant mortality. However, infant mortality is already very low in developed countries, and significant improvements are no longer possible. On the other hand, preventing deaths at older ages has less impact on e_0, but there is greater room for improvement as gains in e_0 may be made by, for instance, controlling disease risk factors and preventing, postponing, or slowing down the progression of a disease. Analyses for developed countries show the e_0 increases in the last decades were mainly due to lower mortality in older age groups (1, 2, 10).

As future gains in e_0 are chiefly attributed to improved responses to noncommunicable diseases and changing social and environmental determinants of health (15), we can expect gains in e_0 will continue to be made in higher age groups. A better understanding of potential improvements in e_0 is growing in importance, because life expectancy gains concentrated at the end of life can unsettle any economy and may have even stronger negative effects in countries like Slovenia, having experienced a rapid rise in life expectancy and notable and rapid population ageing, requiring prompt policy and societal changes.

We estimate improvements in e_0 due to reduced mortality from various groups of causes of death made between 1997 and 2014, and potential improvements, using Spain, with the highest e_0 among all EU countries in 2014, as a benchmark. We also look for differences between groups of causes of death in age terms, in which the strongest gains in e_0 are possible. By decomposing potential gains

in e_0 by age, we thus show whether these gains are potentially greater in working ages, or when people are mostly retired.

2 METHODS

In this study, we employ life tables that are used to describe age-specific mortality rates of a population. A life table is a demographic model that builds on age-specific mortality rates of an actual population in a given year (16-18). Age specific mortality rates are converted into probabilities of dying, which are applied to a cohort of newborn children (a round number, usually 100,000, is assumed). The dying-off process is observed through life-table functions: from each age to the next, the population is decremented according to the fixed age-specific mortality probabilities until all members have died (16). If we divide the number of years to be lived by all cohort members during their life (the "total number of person-years") by 100,000, we obtain life expectancy at birth e_0. It shows the expected longevity if the mortality pattern remains unchanged. Thus, e_0 is not affected by the age distribution and is therefore comparable geographically and across time. We use abridged period life tables for 5-year age groups (16-18) due to data availability. We use the 1997–2014 period data from the National Institute of Public Health (NIPH) (19) and Eurostat (20).

2.1 Potential Gains in Life Expectancy

By modifying the mortality pattern, we can estimate potential gains in e_0 (8), attained by changing various determinants of life expectancy. According to WHO (15), much of the gain in e_0, in developed countries, can be achieved by tackling noncommunicable diseases and changing social and environmental determinants of health.

In Slovenia, the five major groups of causes of death (according to ICD-10) in the last decades have been, namely: diseases of the circulatory system, neoplasms, external causes of morbidity and mortality, diseases of respiratory system, and diseases of digestive system (19). These five groups combined represented 90% of all deaths in Slovenia in 2014. All other causes of death with a notably smaller share are allocated to "Other causes of death". The analysed groups of causes' contributions to the total mortality rate are shown in Figure 2.

Figure 2 shows a substantial drop in mortality rates. The improvement in e_0 due to reduced cause-specific mortality can be calculated using different approaches, involving either complete or partial elimination of causes of death. The obtained potential gain in e_0 reveals the impact of each cause of death.

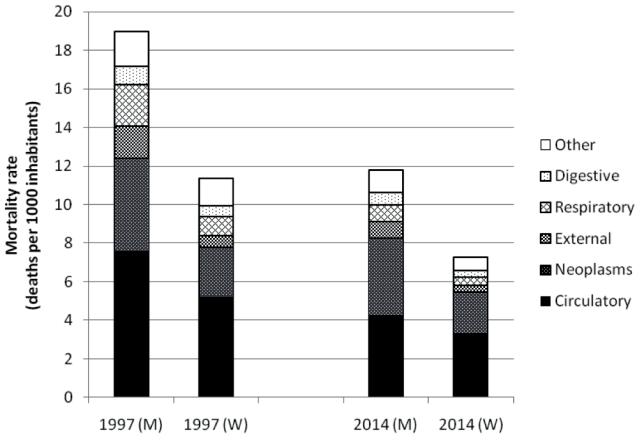

Figure 2. Age-standardised, cause-specific mortality rates for analysed groups of causes of death (according to ICD-10) for men (M) and women (W) in 1997 and 2014, Slovenia (standard age structure: total population 2014) (19, 20).

Cause-eliminated life tables answer the hypothetical question of what a life-table cohort's mortality would be if a particular cause of death were completely eliminated (21). Compared to the master life table, the number of deaths is now set to 0 for the analysed cause, whereas it remains unaltered for all other causes. For persons who actually died from the analysed cause of death, it is thus assumed they would still be alive and as healthy as their peers in the same age group, leading to lower death rates and higher e_0. In reality, eradicating a certain disease is likely to result in increased mortality due to other diseases, especially in older ages, when people often have more than one illness ("competing risks") (18). However, by constructing cause-eliminated life tables no interdependencies among the causes of death are assumed. The assumption of independence can hardly be avoided until more is known about the interdependency of various causes of death (8). Also, when the causes are distant (disease) categories, the correlation has a very small effect on the results, and therefore the assumption of independence among causes of death may be considered acceptable (9).

Because entirely eliminating a cause of death is an unrealistic assumption, we analyse the effects of a partial reduction (8) in mortality. We assume the probability of dying for Slovenia could fall to the level of a better performing comparable country. We estimate the potential gains in e_0 by assuming the probability of dying in Slovenia would decrease to the Spanish levels from 2014. Spain was selected because, in recent years, it has had the highest e_0 among EU-28 countries (13). Ediev (22) argues that, although future gains will become ever harder to achieve when approaching the biological limit on the length of life, in the future, e_0 could rise to above

95 and even close to 100 years, with up to 40% of a cohort becoming centenarians. Besides having the highest e_0, Spain is comparable with Slovenia regarding risk factors, such as smoking and physical activity (23), the two key risk factors (7, 12) for the two most important groups of causes of death, namely: circulatory diseases and neoplasms. Relevant data are available from the Spanish national statistical institute (INE) (24).

2.2 Age- and Cause-Specific Decomposition

To investigate which age groups exhibit the strongest gains in e_0, a decomposition by age is conducted. The most commonly applied decomposition methods include the Arriaga (25) and Pollard (26) approaches. Although mathematically equivalent (26), the various discrete approximations give somewhat different results. Arriaga's approach underestimates the contribution of older age groups (21), but with the Pollard's method, the total of partial contributions does not precisely add up (27) because of approximate formulae derived from the continuous approach. The Pollard's method also requires detailed life tables for age groups above 85 years in order to measure the last open-ended age group's contribution. In this paper, the correct summation of e_0 differences across age groups is ensured by using a different weighting formula for Pollard's approach suggested by Pressat (28):

$$e_0^{\,2} - e_0^{\,1} \cong \sum_{x=0}^{\omega}\left[\frac{l_x^{\,1}+l_x^{\,2}}{2}\left(e_x^{\,2}-e_x^{\,1}\right)-\frac{l_{x+n}^{\,1}+l_{x+n}^{\,2}}{2}\left(e_{x+n}^{\,2}-e_{x+n}^{\,1}\right)\right],$$

where standard life-table function notations are used with 1 and 2 denoting different points in time, different countries, or any other different populations.

To this age decomposition we also apply a procedure (29) for simultaneous decomposition by cause of death. This technique requires mutually exclusive and exhaustive causes of death. Here we assume an individual cause of death's contribution to the e_0 change in each age group is proportional to the mortality change arising from that cause of death in the total mortality rate change for the same age group.

3 RESULTS

Partial contributions of decreased mortality by individual age groups and different groups of causes of death to the total increase in e_0 between 1997 and 2014 are presented in Table 1.

Table 1. Contributions of age groups and different groups of causes of death to the 1997–2014 increase in life expectancy at birth e_0 (in years) by gender in Slovenia.

1997–2014 change in e_0 (years)	Men							Women						
Age group	All causes	Circ.	Neopl.	Ext.	Resp.	Dig.	Other	All causes	Circ.	Neopl.	Ext.	Resp.	Dig.	Other
0	0.29	0.00	0.00	0.01	0.02	0.00	0.27	0.20	0.01	0.01	0.02	0.00	0.00	0.17
1-4	0.05	0.02	0.01	0.00	0.00	0.01	0.01	0.06	0.00	0.03	0.01	0.00	0.00	0.02
5-9	0.09	0.00	0.00	0.06	0.00	0.01	0.03	0.00	0.00	-0.01	0.01	0.00	0.00	0.01
10-14	0.08	0.00	0.02	0.05	0.00	0.00	0.00	0.01	0.00	0.02	0.00	0.00	0.00	0.00
15-19	0.09	0.00	-0.01	0.10	0.00	0.00	0.00	0.07	0.00	0.00	0.04	0.00	0.00	0.03
20-24	0.22	0.01	0.02	0.18	0.00	0.00	0.01	-0.02	0.00	-0.01	-0.01	0.00	0.00	0.00
25-29	0.23	0.00	0.00	0.18	0.00	0.01	0.03	0.04	0.00	0.01	0.02	0.00	0.00	0.00
30-34	0.17	0.04	0.00	0.11	0.01	0.02	0.00	0.04	0.00	0.02	0.01	0.00	0.00	0.01
35-39	0.24	0.02	0.05	0.10	0.00	0.04	0.03	0.11	0.01	0.03	0.05	0.00	0.01	0.02
40-44	0.37	0.09	0.04	0.15	0.01	0.05	0.03	0.17	0.03	0.06	0.03	0.00	0.03	0.02
45-49	0.46	0.12	0.12	0.11	0.01	0.06	0.04	0.20	0.01	0.08	0.04	0.00	0.03	0.04
50-54	0.54	0.19	0.13	0.11	0.03	0.05	0.05	0.23	0.05	0.05	0.03	0.01	0.04	0.06
55-59	0.55	0.21	0.12	0.08	0.04	0.06	0.03	0.27	0.07	0.06	0.03	0.02	0.07	0.02
60-64	0.74	0.25	0.24	0.08	0.04	0.08	0.05	0.30	0.13	0.04	0.03	0.02	0.05	0.02
65-69	0.79	0.34	0.19	0.05	0.12	0.04	0.06	0.49	0.20	0.11	0.03	0.03	0.04	0.08
70-74	0.66	0.36	0.12	0.02	0.08	0.04	0.04	0.53	0.29	0.03	0.04	0.07	0.02	0.08
75-79	0.67	0.37	0.09	0.04	0.13	0.00	0.04	0.71	0.43	0.05	0.01	0.09	0.04	0.08
80-84	0.43	0.27	-0.04	0.01	0.14	0.01	0.04	0.78	0.45	0.02	0.05	0.10	0.03	0.13
85+	0.38	0.18	-0.02	0.05	0.12	-0.01	0.06	0.80	0.34	0.05	0.00	0.21	0.00	0.20
All ages	7.03	2.45	1.08	1.47	0.76	0.45	0.81	5.01	2.02	0.65	0.44	0.56	0.35	0.98

Explanation of abbreviations: Circ. – diseases of the circulatory system, Neopl. – neoplasms, Ext. – external causes of morbidity and mortality, Resp. – diseases of respiratory system, Dig. – diseases of digestive system, Other – all other causes of death not included in previous five groups.

Past improvements in e_0 indicate the mortality patterns have been changing. The likely underlying reasons are living conditions and national income, patient awareness and empowerment in treatment options etc. (30, 31). By modifying the mortality pattern, we can assess potential gains in e_0 from improving such determinants of life expectancy. One option is to estimate potential gains in e_0 by completely eliminating one individual cause of death at a time (Table 2).

As shown by Table 2, e_0 could still be improved. However, given that complete elimination of individual causes of death is unrealistic, we focus more (presenting results also by age groups) on partial potential gains in e_0. We assume that Slovenian mortality rates would change to Spanish levels in 2014 for each age group and each group of causes of death, resulting in e_0 of 80.2 and 86.1 years for men and women, respectively (Table 3).

Table 2. Potential gains in life expectancy (PGLE) at birth e_0 (in years) if one group of causes of death is completely eliminated for persons born in 2014, Slovenia, by gender.

2014 PGLE (years)	Men						Women					
Group of causes	Circ.	Neopl.	Ext.	Resp.	Dig.	Other	Circ.	Neopl.	Ext.	Resp.	Dig.	Other
All Ages	5.74	4.75	1.42	0.69	0.71	1.46	10.98	3.73	0.67	0.59	0.49	1.30

Explanation of abbreviations: see Table 1.

Table 3. Age- and cause-specific decomposition of potential gains in life expectancy (PGLE) at birth e_0 (in years) if Slovenian mortality levels are changed to Spanish ones in 2014, by gender.

PGLE (years)	Men							Women						
Age group	All causes	Circ.	Neopl.	Ext.	Resp.	Dig.	Other	All causes	Circ.	Neopl.	Ext.	Resp.	Dig.	Other
0	-0.11	0.00	0.00	0.00	0.00	0.00	-0.10	-0.06	0.00	0.00	0.00	0.00	0.00	-0.05
1-4	-0.02	0.00	-0.01	-0.01	0.00	0.00	0.00	-0.03	0.00	-0.01	0.00	0.00	0.00	-0.01
5-9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00
10-14	0.01	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	-0.01	0.01	0.00	0.00	0.00
15-19	0.04	0.00	-0.01	0.04	0.00	0.00	0.01	-0.01	0.00	0.00	0.00	0.00	0.00	-0.01
20-24	0.01	-0.01	-0.02	0.04	0.00	0.00	0.00	0.05	-0.01	0.01	0.03	0.00	0.00	0.02
25-29	0.03	0.00	-0.01	0.05	0.00	0.00	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
30-34	0.07	-0.01	0.00	0.06	-0.01	0.01	0.02	0.02	0.00	0.00	0.01	0.00	0.00	0.01
35-39	0.10	0.01	0.01	0.06	-0.01	0.01	0.02	0.02	-0.01	0.01	0.02	0.00	0.00	0.00
40-44	0.03	-0.02	0.01	0.03	-0.01	0.02	0.00	-0.01	-0.01	0.02	-0.01	0.00	0.00	-0.01
45-49	0.02	-0.01	-0.02	0.05	-0.01	0.01	0.00	0.02	0.02	0.00	0.01	-0.01	0.01	-0.02
50-54	0.08	0.00	0.01	0.06	-0.02	0.03	0.01	0.02	0.00	0.02	0.01	-0.01	0.00	-0.01
55-59	0.17	0.03	0.03	0.05	-0.02	0.05	0.04	0.09	0.01	0.07	0.00	-0.01	0.01	0.01
60-64	0.29	0.11	0.08	0.04	-0.03	0.04	0.06	0.20	0.02	0.12	0.01	-0.01	0.03	0.03
65-69	0.23	0.15	0.02	0.04	-0.03	0.03	0.02	0.18	0.08	0.11	0.00	0.00	0.01	-0.03
70-74	0.32	0.15	0.13	0.06	-0.02	0.02	-0.02	0.29	0.14	0.16	0.02	-0.01	0.01	-0.02
75-79	0.17	0.17	0.08	0.03	-0.06	0.03	-0.07	0.26	0.20	0.13	0.03	-0.02	0.01	-0.09
80-84	0.30	0.26	0.16	0.05	-0.05	0.01	-0.13	0.36	0.40	0.15	0.02	-0.02	0.01	-0.20
85+	0.28	0.56	0.12	0.05	-0.09	-0.02	-0.33	0.61	1.46	0.13	0.14	-0.12	-0.02	-0.99
All ages	2.05	1.39	0.58	0.70	-0.37	0.21	-0.46	2.01	2.31	0.91	0.33	-0.23	0.07	-1.38

Explanation of abbreviations: see Table 1.

If current mortality rates for Slovenia were to change to the levels of Spain in 2014, the largest contribution to longer e_0 would stem from lower mortality from circulatory diseases for both genders, followed by neoplasms for women and external causes and neoplasms for men. For both genders, the biggest improvement in e_0 would arise from the highest age groups due to circulatory diseases, neoplasms and digestive system diseases. For deaths due to external causes, similar potential gains in e_0 could be achieved in different age groups for men.

Table 3 reveals negative values of potential gains in e_0 for other causes of death and respiratory diseases, meaning that in 2014, Slovenian mortality – due to respiratory diseases and other causes of death (the latter is also clearly seen in the first year of life) – was already lower than Spanish. The large negative values in "Other causes of death" for higher age groups, especially for women, are due to lower mortality from causes of death characteristic of old age (such as diabetes, senility, osteoporosis, etc.). According to available data (19, 24), mortality from these causes is much higher in Spain than in Slovenia. We also computed the results for Sweden in 2014, whereby the "Other" group again has a highly negative value of -1.36 years for women and -0.46 years for men. We suspect that decreasing mortality from circulatory diseases and neoplasms results in higher mortality from other causes of death. However, comparing the e_0 for Spain in 2014 with the e_0 for Spain in 2006 (when e_0 was almost the same as in Slovenia in 2014), the value is positive (0.35 years for men and 0.26 years for women) for the "Other" group and also for respiratory diseases. The peculiarly negative results for these two groups of causes of death in Slovenia need further investigation – whether mortality in Slovenia is actually lower, or whether there are problems with underreporting (32).

By combining Tables 2 and 3, we can assess what shares of Slovenian 2014 potential gains in e_0 would be realised if Spanish mortality levels had been reached. Regarding three of the major groups of causes of death – circulatory diseases, neoplasms and external causes – much can be done. For external causes, about one-half of the potential gain in e_0 (Table 2) could actually be realised by achieving Spanish mortality rates from 2014 (50% (=0.71/1.42) for men and 48% (=0.32/0.67) for women).

4 DISCUSSION AND CONCLUSIONS

In Slovenia, life expectancy at birth e_0 has been zooming in the last decades, particularly between 2004 and 2014. Our analysis confirms that, in Slovenia, most of the improvement in e_0 resulted from lower mortality in older age groups due to better prevention and treatment of circulatory diseases and neoplasms, which is in line with (1, 2, 10, 11). This paper also estimates possible future gains in e_0 that could be achieved by reducing mortality from major groups of causes of death. Social change and health education generally are expected to continue improving longevity, and even have a stronger role than medical treatments themselves (33), also because people will reach old age in better health (34).

Estimated potential gains in e_0 for Slovenia using Spain (i.e., the country with the highest e_0 in the EU-28) as a benchmark reveal that mortality related to respiratory diseases and newborn care is already lower in Slovenia. This calls for further investigation. However, there is room for improvement in the area of circulatory diseases, especially at older ages. Spain also has considerably lower mortality due to neoplasms (particularly in older ages), as well as due to external causes for men in almost all age groups above 20 years.

The results presented in this paper identify which causes of death- and age-related improvements in mortality produce the highest potential gains in e_0, thereby indicating certain priority areas for Slovenia. Identifying the best policy actions, however, is beyond this paper's scope, even though it clearly shows challenging and unavoidable policy responses are required to prevent negative increased longevity impacts on economic sustainability. Future gains in e_0, that will continue to be realised at later ages can be expected to lead to a lower labour force participation time span as a proportion of life expectancy at birth, unless there is a significant rise in labour force participation rates across middle and older ages. As Eggleston and Fuchs (1) note, lengthier retirement lives are inconsistent with continued rises in per capita income, unless there are notable increases in savings, investment and productivity. Improving productivity and increasing ability to work later in life will play a central role. Investments in public health and medical technologies that improve quality of life, assessing the value of innovation by considering not only costs of care, but also productivity gains and prevention, timely detection and effective management of chronic diseases, will help alleviate these diseases' economic burden in the context of growing longevity.

CONFLICTS OF INTEREST

The authors declare that no conflicts of interest exist.

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ETHICAL APPROVAL

All data used in this study were provided by NIPH, INE and Eurostat. All personal data were anonymised.

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ASSESSMENT OF THE ASSOCIATION BETWEEN DENTATE STATUS AND SELF-RATED GENERAL HEALTH

OCENA POVEZANOSTI MED ZOBNIM STATUSOM IN SAMOOCENO SPLOŠNEGA ZDRAVJA

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ABSTRACT

Objective. Aiming at preparing the basis for evidence-based dental public health policy making in Slovenia, the objective of the study was to assess the strength of association between oral health status measured by the number of missing teeth and self-rated health (SRH).

Methods. The study was designed as a pooled individual-level data study from four national cross-sectional studies carried out in the period 2001-2012, based on CINDI Health Monitor methodology. Altogether, 34,412 participants were included. A logistic regression model with poor SRH as observed outcome and the number of teeth as explanatory factor (adjusted for selected biologic, socio-economic and health factors) was proposed.

Results. In the sample, women represented 55.7% and men 44.3%, median age was 45 years. Persons with more missing teeth more likely rated their health as poor. The association was persistent even when different confounding variables were included in the model. In the group with 1-5 missing teeth, in comparison to the group with none missing teeth, OR was 1.23 (p=0.049), whereas for the group with 6-10 missing teeth, OR was 1.32 (p=0.019); for the group with >10 missing teeth, but not all, OR was 1.77 (p<0.001), and for the group with all missing teeth, OR was 2.19 (p<0.001).

Conclusion. Study results showed clear association of SRH with dentate status, which confirms the oral-general health connection. This indicates the need for the development of proper dental public health policies for better oral health, and presents a new view on the importance of preserving teeth.

Keywords:
self-rated health, oral health, missing teeth, preserved teeth, public health policy

IZVLEČEK

***Namen**. Z namenom priprave podlage za pripravo na dokazih temelječe politike ustnega javnega zdravja v Sloveniji je bil cilj raziskave ocena povezanosti stanja ustnega zdravja, merjenega s samoporočanim številom manjkajočih zob in samoocene lastnega zdravja.*

***Metode**. Zasnovo raziskave je predstavljala analiza združenih podatkov na individualni ravni, pridobljenih v štirih zaporednih nacionalnih presečnih raziskavah v Sloveniji, izvedenih v obdobju 2001-2012 po metodologiji CINDI Health Monitor. Skupno je bilo v analizo vključenih 34.412 udeležencev. Ženske so predstavljale 55,7% in moški 44,3%, mediana starosti je bila 45 let. V modelu logistične regresije je bila opazovana spremenljivka samoocena lastnega zdravja kot slabega, pojasnjevalna spremenljivka pa samoporočano število manjkajočih zob (upoštevani izbrani biološki, socialno-ekonomski in z zdravjem povezani moteči dejavniki).*

***Rezultati**. Osebe z več manjkajočimi zobmi imajo višje obete za to, da ocenjujejo svoje zdravje kot slabo, kar velja tudi po prilagoditvi za nekatere biološke, socialne in zdravstvene dejavnike. Razmerje obetov za nizko samooceno lastnega zdravja v primerjavi s skupino brez manjkajočih zob je bilo pri osebah z 1-5 manjkajočimi zobmi 1,23 (p=0,049), za skupino s 6-10 manjkajočimi zobmi 1,32 (p=0,019), za skupino z več kot 10 manjkajočimi zobmi 1,77 (p<0,001) in za skupino z vsemi manjkajočimi zobmi 2,19 (p<0,001).*

***Zaključek**. Raziskava je pokazala jasno povezanost med samoocenjenim splošnim zdravjem in zobnim statusom, kar potrjuje povezanost ustnega in splošnega zdravja. Rezultati tudi nakazujejo potrebo po razvoju primernih politik ustnega javnega zdravja za boljše ustno zdravje in hkrati nakazujejo tudi nov pogled na pomen ohranitve zob.*

Ključne besede:
samoocena zdravja, ustno zdravje, manjkajoči zobje, ohranjeni zobje, javnozdravstvene politike

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1 INTRODUCTION

Mouth with teeth and oral tissues play an important role in human lives. Compartmentalisation of oral health has been replaced by the belief that it is an integral part of general health and has an influence quality of life. To maintain and improve oral health, it is essential to carry out hygiene measures and perform dental check-ups regularly. Retention of functional, aesthetic and natural dentition of not less than 20 teeth throughout life is World Health Organization's (WHO's) goal, actually a milestone on the road to retention of all natural teeth (1). It is based on the evidences that masticatory ability is related to the number of teeth, and that this ability is impaired when the patient has less than 20 well-distributed teeth (2); in addition, it is in agreement with short dental arch (SDA) concept (3). Regular dental check-ups are also important, because multiple systemic diseases and imbalances have different signs in oral cavity, and sometimes these manifestations are disease-specific (4). Oral-systemic connection is bidirectional, as studies show association of periodontal disease with cardiovascular diseases, diabetes mellitus, and pregnancy outcomes (5).

Trying to understand the potential oral-systemic association, it is important to consider a wider look on health, which – besides biomedical status – takes into account also the patient's ability to perform daily activities (6). This broader multidimensional view is used in the concept of health surveys which encompass traditional clinical assessment and also the individual's subjective assessment of health status impact on his or her own wellbeing and daily functioning (7). Health-related quality of life (HRQoL) with the inclusion of the patient's perspective represents measurement tools with a more holistic approach to health. It is affected by the individual's physical health, psychological state, personal beliefs, social relationships, and the relationship to salient features of the individual's environment (8). On the same theoretic base, measurements of Oral Health-Related Quality of Life (OHRQoL) was developed (9).

One similar and simpler measurement, which is a part of self-rated quality of life tools, is self-rated health (SRH). It represents personal and subjective perception of one's own health, and it could be biased according to social desirability, expectations and relative deprivation (10). Researchers have explored different influences and correlations between self-perceived health status and characteristics of one's social environment (11). The importance of SRH can be explained by simplicity and the fact that researchers confirmed SRH has an independent effect on mortality (12-14), morbidity (15) and hospitalizations (16). Self-assessment of health is a widely used method in epidemiology, and can be assessed through different questionnaires. Most widely used are single-item indicators that differ in the number of available answers, but, in general, they represent a parallel assessment of subjective health (10). A study in Slovenia using SRH showed that PSRH is associated with multimorbidity and unhealthy life-style (17). Subjective evaluation of health is used also in econometric analyses and health technology assessment (18).

Multiple biological mechanisms are connecting oral diseases to systemic health (5). Tooth loss represents the main consequence of persistent or past oral diseases, injuries, or compromised possibilities of dental healthcare utilization. It can affect someone's appearance, psychical state and well-being (19). But does it influence self-rated general health, which is connected to other confirmed negative health outcomes? This was the main question we wanted to answer with our study.

Aiming at preparing the basis for evidence-based policy making in the field of dental public health in Slovenia, the objective of the study was to assess the strength of association between oral health status measured by the number of missing teeth and self-rated health (SRH), controlled for some characteristics of one's social environment and major health problems.

2 METHODS

The study was designed as a pooled individual-level data study from four cross-sectional studies, based on the methodology of the WHO Countrywide Integrated Non-Communicable Disease Intervention (CINDI) Health Monitor database (CHM) in Slovenia (CHMS). The surveys were conducted in 2001, 2004, 2008 and 2012, and the number of participants invited was 15379, 15297, 15963, and 16000, respectively, in the frame of CINDI Slovenia.

Based on the CHM Core Questionnaire (20, 21), Slovene self-administered postal questionnaire was created. In 2012, also the possibility for online responses existed. Different approaches, including extensive media campaigns, a lottery with prizes enhancing healthy behaviour, and up to two reminder letters, were used.

SRH by participants was the observed outcome. It was measured through a single question: "How would you assess your present state of health?" Five-level Likert-like scale with answers "very good,""good,""fair,""poor" and "very poor" was used. For the purpose of the analysis, the new variable PSRH was created, in which participants who rated their health as poor or very poor were pooled in a group of interest (PSRH: 0=no, 1=yes).

Dentate status as explanatory factor of interest was self-assessed by the question: "How many teeth are you missing?" Predefined answers were: 0 - none, 1 – 1 to 5, 2 - 6 to 10, 3 - more than 10 but not all, 4 – all teeth are missing/I have dentures.

Confounders gender, age, educational level, type of work and self-classified social class were assessed. Additionally, information on self-reported persistence of diagnosed diseases, self-confirmed pain in the last 30 days, and admission to the hospital in the past twelve months was included. Ages of the participants were recoded from the reported year of birth and arranged into five categories, starting with 25-29, then three 10-year categories, 30-39, 40-49 and 50-59, and the last category from 60 to 64 years (the participants aged 65-74 were excluded from the analysis). In the assessment of the education level, participants were able to choose one out of seven categories (1 - incomplete primary, 2 - primary, 3 - vocational, 4 - secondary, 5 - college, 6 - university and 7 - postgraduate), which represented their highest level of education achieved. For the needs of the analysis, the last two categories were combined into one. The question about the type of work consisted of 10 different categories of self-classification. For most judicious use of this data, we combined them into 4 categories, according to work characteristics. These categories were, namely: 1 - heavy work (agriculture, farming, forestry, industry, mining and construction), 2 - administrative and intellectual work (work in office, light physical work, services, higher management, research, development, and students), 3 - housekeeping (housekeeper and pensioners) and 4 - unemployed (at the time of the study). Self-reported social class was assessed by the question: "In your option, which social class do you belong to?" Participants could choose one of the answers: 1 – lower, 2 – labour, 3 – middle, 4 – upper-middle, and 5 - upper); for the needs of the analysis, upper-middle class and upper class were combined. Self-reported diseases of participants were assessed by the question: "Do you have any of conditions, confirmed by a physician?" Participants chose between answers: 1 - No, 2 - Yes, it was confirmed in the last year, and 3 – Yes, it was confirmed more than a year ago. During statistical analysis the last two answers were combined into a single category. From the list of questions, six diseases, which have impact on daily activities, were included into the analysis, namely: myocardial infarction, angina pectoris, heart failure, cerebrovascular insult, back illness, and rheumatism or arthritis. The participants were categorized into categories according to the number of confirmed conditions (1 - without any of the specified conditions, 2 - one of the specified conditions, 3 - more than one of the specified conditions). We also included the information on some pain symptoms in the last month (chest pain during physical activity, back pain, shoulder/neck pain, joint pain, headache and toothache). It was assessed by the question: "Have you had any of the following symptoms or complaints during the last 30 days?" Participants could choose between two answers: 1 - Yes and 2 - No. The answers were again combined into three groups depending on the number of reported problems (1 - with none of the problems, 2 - with one of the problems, 3 - with more of the problems). The information on hospital admissions was included as well. Data were assessed from the question: "How many times, during the last twelve months, were you admitted into the hospital?". Participants answered the question with the number of admissions. For the purpose of the analysis, answers were aligned into groups according to the number of admissions: none, one time and multiple times. Finally, the year of the survey was included in the analysis as a confounder.

The association between PSRH and the number of missing teeth as explanatory variable, adjusted for confounders, was assessed univariately, using chi-square tests. The association was assessed multivariately, using binary multiple logistic regression (LR). The dummy variables were created for explanatory and confounding variables, using the simple method. In all statistical tests, $p \leq 0.05$ was considered significant. The IBM SPSS for Windows Version 21.0 (SPSS Inc., Chicago, IL., USA) software was used.

3 RESULTS

In the pooled sample, there were 34412 participants, aged 25-64 (2001: 9034, 2004: 8528, 2008: 7352, 2012: 9498), whose questionnaires were eligible for analysis. Response rate was 62.9% in 2001, 57.4% in 2004, 49.0% in 2008, and 59.6% in 2012. There was a slight predominance of females, but participants were equally distributed across age groups – median age was 45 years. Further characteristics are presented in Table 1.

Table 1. Characteristics of participants taking part in the study of pooled individual-level data from four cross-sectional studies in Slovenia, from 2001-2012.

Characteristic	Category	N	%
Gender	Men	15258	44.3%
	Women	19154	55.7%
Age (years)	25-29	3585	11.4%
	30-39	7527	24.0%
	40-49	8251	26.3%
	50-59	8333	26.5%
	60-64	3695	11.8%
Educational level	Incomplete primary	1604	4.7%
	Primary	5088	15.0%
	Vocational	8960	26.4%
	Secondary	10065	29.6%
	College	2917	8.6%
	University	5318	15.7%
Type of work	Heavy work	4776	14.4%
	Administrative/intellectual work	16546	50.0%
	Housekeeping	9510	28.8%
	Unemployed (job seeker)	2234	6.8%
Social class	Lower	1002	3.1%
	Labour	11899	36.9%
	Middle	15678	48.7%
	Upper-middle	3333	10.3%
	Upper	297	0.9%

SRH was reported by 34085/34412 participants (99.0%), among them very good SRH was reported by 10.7%, good SRH was reported by 41.9%, 38.3% reported fair SRH, 7.5% poor SRH, and 1.4% reported very poor SRH. The prevalence of very good and good SRH was higher in people with less missing teeth, whereas the prevalence of fair, poor and very poor SRH was higher in persons with more missing teeth. The association between variables was highly significant (p<0,001).

The prevalence of PSRH was 9.0% (3076/34085). The question about dentate status was answered by 34041/34412 participants (98.9%). About two thirds of them had 5 or less missing teeth. After cross-matching, both questions were adequately answered by 33908/34412 (98.5%). The estimates of the prevalence of PSRH in each category of dentate status are presented in Table 2. The prevalence of PSRH is rising with increasing number of missing teeth. The differences were highly statistically significant (p<0.001). In Table 2 also estimates of prevalence of PSRH according to different socio-economic and health characteristics are presented, along with the results of univariate statistical analysis.

Complete data for LR analysis were available for 24862/34412 participants (72.2%). The results of the logistic regression model showed a statistically significant association between PSRH and dentate status, when this relationship was adjusted to several confounders. Significance of Hosmer-Lemeshow test of the model was p=0.249; the model explained 30.9% of variance. The OR were rising with a higher number of missing teeth and were significant for all groups of people with missing teeth, in comparison with persons with no missing teeth. Detailed results are presented in Table 3, and were robust to regrouping participants according to age categories (10-year categories) and the type of work (separating pensioners and housekeepers).

Table 2. Estimates of the prevalence of poor self-rated health (PSRH) according to dentate status and selected socio-economic and health-related factors in a study of pooled individual-level data from four cross-sectional studies in Slovenia, from 2001-2012.

Risk factor	Category	N_{tot}	N_{PSRH}	N_{cat}	N_{PSRH}/ N_{cat} (%)	p
Missing teeth	None	33908	206	6126	3.4%	<0.001
	1 to 5		1178	16638	7.1%	
	6 to 10		550	4763	11.5%	
	More than 10, but not all		763	4518	16.9%	
	All teeth - wear denture		353	1863	18.9%	
Gender	Men	34085	1373	15104	9.1%	0.705
	Women		1703	18981	9.0%	
Age (years)	25-29	31090	92	3565	2.6%	<0.001
	30-39		305	7472	4.1%	
	40-49		759	8154	9.3%	
	50-59		1082	8237	13.1%	
	60-64		433	3662	11.8%	
Educational level	Incomplete primary	33649	419	1587	26.4%	<0.001
	Primary		853	5039	16.9%	
	Vocational		864	8860	9.8%	
	Secondary		614	9991	6.1%	
	College		130	2895	4.5%	
	University		124	5277	2.3%	
Type of work	Heavy work	32771	562	4734	11.9%	<0.001
	Administrative/intellectual work		681	16408	4.2%	
	Housekeeping		1263	9425	13.4%	
	Unemployed (job seeker)		427	2204	19.4%	
Social Class	Lower	31936	332	990	33.5%	<0.001
	Labour		1513	11800	12.8%	
	Middle		804	15544	5.2%	
	Upper-middle/Upper		113	3602	3.1%	
Admission to hospital	No	31818	1911	27493	7.0%	<0.001
	Once		595	3291	18.1%	
	Multiple times		336	1034	32.5%	
History of health problems in the last 30 days	None	33787	226	7247	3.1%	<0.001
	One		958	17818	5.4%	
	More than one		1857	8722	21.3%	
Confirmed health problem by physician	None	33865	718	21062	3.4%	<0.001
	One		1778	10804	16.5%	
	More than one		472	999	47.2%	
Year	2001	34085	850	9009	9.4%	<0.001
	2004		796	8321	9.6%	
	2008		701	7302	9.6%	
	2012		729	9453	7.7%	

Legend: N_{tot}=the total number of respondents, N_{PSRH}=the number of participants with poor self-rated health, N_{cat}=the number of respondents within the category.

Table 3. Results of logistic regression analysis of the association of dentate status withthe prevalence of poor self-rated health (PSRH) in a study of pooled individual-level data from four cross-sectional studies in Slovenia, from 2001 to 2012.

Risk factor	Category	OR	95% CI for OR limits		p
			N_{cat}	N_{PSRH}/ N_{cat} (%)	
Missing teeth	None	1.00			
	1 to 5	1.23	1.00	1.51	0.049
	6 to 10	1.32	1.05	1.67	0.019
	More than 10, but not all	1.77	1.40	2.25	<0.001
	All teeth - wear denture	2.19	1.64	2.91	<0.001
Gender	Men	1.00			
	Women	1.24	1.11	1.38	<0.001
Age (years)	25-29	1.00			
	30-39	1.23	0.92	1.64	0.163
	40-49	1.71	1.29	2.26	<0.001
	50-59	1.72	1.29	2.29	<0.001
	60-64	1.35	0.97	1.87	0.074
Educational level	University	1.00			
	Incomplete primary	2.55	1.86	3.50	<0.001
	Primary	1.71	1.29	2.27	<0.001
	Vocational	1.41	1.08	1.84	0.011
	Secondary	1.47	1.14	1.89	0.003
	College	1.11	0.81	1.52	0.519
Type of work	Administrative/intellectual work	1.00			
	Heavy work	1.37	1.16	1.60	<0.001
	Housekeeping	1.21	1.02	1.42	0.027
	Unemployed (job seeker)	2.34	1.96	2.80	<0.001
Social Class	Middle	1.00			
	Lower	3.97	3.18	4.96	<0.001
	Labour	1.49	1.31	1.70	<0.001
	Upper-middle/Upper	1,06	0.83	1.36	0.640
Admission to hospital	No	1.00			
	Once	2.55	2.23	2.92	<0.001
	Multiple times	4.12	3.38	5.02	<0.001
History of health problems in the last 30 days	None	1.00			
	One	1.20	0.98	1.47	0.075
	More than one	3.83	3.12	4.70	<.001
Confirmed health problem by physician	None	1.00			
	One	2.94	2.60	3.32	<0.001
	More than one	6.93	5.58	8.60	<0.001
Year	2012	1.00			
	2001	1.53	1.31	1.78	<0.001
	2004	1.65	1.41	1.94	<0.001
	2018	1.53	1.31	1.80	<0.001

Legend: CI=confidence interval, OR=odds ratio.

4 DISCUSSION

Results of our study showed that there exist differences in the prevalence of PSRH between groups according to the number of missing teeth. People with more missing teeth will more likely rate their general health as poor. Results are highly significant. The biggest likelihood of rating one's own health as poor was for people with all of their teeth lost, or for people who wore dentures. We could try to explain this by lost functionality. This relationship was significant even when some health problems and socioeconomic characteristics, known to influence SRH (11), were taken into account. This indicates the importance of oral health, reflected through the number of missing teeth in self-evaluation of health, and also addresses the general belief that oral health represents an integral part of general health.

A lower number of teeth represent some kind of a functional limitation. The literature review about SDA concept states that dentition comprised of anterior teeth and premolar region fulfils the requirements of functional dentition (22). This means that no more than 8-12 teeth should be missing. We showed that the association exists even with less teeth lost, when functionality should not be compromised. Lost functionality is not the only possible link. This could be risk factors that are associated with oral diseases, which cause tooth loss, and other non-communicable diseases (smoking, alcohol consumption). Systemic effects of periodontal disease, one of the main reasons for tooth loss in adults, can also represent biologic plausibility (5). The drop in prevalence of PSRH in 2012 is somewhat strange in the light of economic crisis, but these results were also observed in some other studies (23). It is possible that the effect of economic crisis has not yet been expressed in poorer SRH, or that its rise is the consequence of changes in community and personal conceptualisation of health.

We showed the association of health issues with PSRH. This also included former hospitalisation. The association between hospitalization and PSRH rises with a higher number of admissions, which may reflect possibilities of more serious diseases. Even PSRH is associated with hospitalisation (16), we also believe that it could be interpreted as a sign of a more serious disease that could be associated with PSRH. In the oldest age group, a drop in the prevalence of PSRH was observed. This could be attributed to changes in personal concepts of health, but other researchers also confirmed improving SRH with age when adjusted to some functional disabilities (24).

The question arises whether SRH is a proper measurement tool in the context of oral health. Studies show small, but significant association between oral and general health-related quality of life, suggesting that the functioning of the mouth or body could be seen as a link between these concepts (25). Masticatory performance is significantly correlated to the number of missing teeth, and it is not in association with the age of the subjects (26). This means that in context of our research, where we study the influence of the number of missing teeth, which definitely represents functional limitation, general health measures could be used.

Even though tooth loss has not been put in association with SRH until now, studies that connect tooth loss with some health outcomes exist. Researchers confirmed associations of tooth loss and disease risk, disease development and increased mortality (27-30). We have shown that a greater number of missing teeth implies bigger odds for PSRH. We know that PSRH is a good predictor of mortality among patients with chronic heart failure too (14). This point to a possible underlying mechanism between SRH and health outcome, which involves teeth and should be a matter of further research.

The study has some limitations. Firstly, it is related to the cross-sectional study design that limits direct conclusions on causality. Another limitation is the self-assessment of data, where more socially desirable answers may be chosen and the final sample may consist mainly from persons more prone to participate. Some of these limitations were addressed by other authors, and they believe that they did not affect the study findings to a great extent (11, 31). Another limitation may arise from the fact that participants might not be sure about the number of missing teeth or might misunderstand the question about the presence of confirmed diseases by their physician. Cohort study with a clinical assessment of oral health status and longitudinal design could overcome some of the aforementioned limitations. Additionally, one can argue that regarding the sample structure, some overlaps in participants across the surveys were possible. However, only about 6% of adult population, aged 25-64 years, was invited to participate in each survey. Consequently, the probability of inclusion of the same person in all studies is very small. One can also argue against selected age groups; however, the same classification/grouping was used by other authors, who analysed CHMS data (11). Although some arguments against a single-item question to assess SRH can be raised, this simple measure represents a comprehensive screening tool for the patient's health status (32).

Nonetheless, the study has some important strengths. The most important one is that, although Slovenia is a small European country, the results could represent a contribution to dental public health in a wider context, since, according to our best knowledge, there does not yet exists any study that would analyse the relationship between PSRH and dentate status. Additionally, results were obtained on a relatively large sample.

Because PSRH is associated with a greater number of missing teeth, which is indeed associated with increased mortality, tooth loss could be another useful predictor of health complications. Results showed that oral health has an important influence on the SRH, even when known confounders are taken into account. This shows that oral and systemic health should not be treated separately, and reflects the importance of oral health itself. All possible measures must be taken to preserve a higher number of natural teeth. This also points out to the need for greater concern about oral health status of the population and more extensive research on the field of public oral health. That will make possible to develop and implicate proper strategies and programmes, to advocate oral health, and to get wider support as well as raise awareness about the importance of oral health in the community. Oral health education for all population groups would help preserve higher number of teeth, and it will possibly have positive effects on SRH.

As far as the future research in the field is concerned, it would be worth placing the question about SROH and other questions related to oral health in future CHMS surveys. That would help to clarify possible associations between oral and general health and help to make further decisions on our way to better health and wellbeing in general.

5 CONCLUSION

PSRH is associated with a higher number of missing teeth. Because PSRH is connected with negative health outcomes, this association should not be neglected. Preserving natural teeth should be considered a global goal for better oral and general health.

CONFLICTS OF INTEREST

The authors declare that no conflicts of interest exist.

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ETHICAL APPROVAL

The research protocol was approved for each survey by the Ethical Committee of the Republic of Slovenia.

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THE HISTORY OF PUBLIC HEALTH USE OF FLUORIDES IN CARIES PREVENTION

ZGODOVINA JAVNOZDRAVSTVENE UPORABE FLUORIDOV V PREVENTIVI KARIESA

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ABSTRACT

Aim. The aim of our study was to chronologically analyse various public health measures of fluoride use in caries prevention.

Methods. We systematically searched the PubMed database on the preventive role of fluorides in public health, published from 1984 to 2014. The search process was divided into four steps, where inclusion and exclusion criteria were defined. Qualitative methodology was used for the article analysis. In the research process, the described forms of F use, diversity of the described F agents, and the observed population group were analysed.

Results. In our systematic review, 40 relevant reviews were revealed. Fluorides have been used in many different forms, but only a few studies showed their significant role in public health. Water fluoridation was the most important public health measure. In the recent decades, the number of studies on topical fluorides is constantly rising. The most extensively described topical forms of fluorides are professionally applied fluoride agents and fluoride toothpaste for home-use. The use of fluoride containing toothpaste in caries prevention is a safe and successful public health measure (PHM) if their use is widespread, and it is recommended for all. The results on other topical forms of fluorides are insufficient to be suggested as an important PHM.

Conclusions. The role of fluorides in public health prevention has changed in accordance with the knowledge about the fluoride cariostatic mechanism. Previously the most important pre-eruptive effect of fluorides was supplemented by the post eruptive effect. Abundant evidence exists to show the effectiveness of systemic and topical fluorides.

Keywords:
fluorides, public health dentistry, caries prevention, epidemiology

IZVLEČEK

***Namen**. Namen naše raziskave je bil kronološko analizirati različne načine javnozdravstvene uporabe fluoridov pri preventivi kariesa.*

***Metode**. Sistematično smo pregledali pregledne članke v bibliografski bazi PubMed, ki so bili objavljeni v obdobju od leta 1984 do leta 2014. Iskalni proces je potekal v štirih fazah, v katerih smo določili vključitvene in izključitvene kriterije za določitev člankov za končno analizo. Za analizo člankov smo uporabili kvalitativno metodologijo. V procesu analiziranja smo se osredotočili na različne oblike in načine uporabe fluoridov, jih opisali ter opredelili uporabo fluoridov in pomen za populacijo, v kateri so bili uporabljeni.*

***Rezultati**. V našem sistematičnem pregledu smo analizirali 40 preglednih člankov. Opisane so številne oblike uporabe fluoridov, vendar le nekatere raziskave poudarjajo javnozdravstveni pomen. Fluoridiranje pitne vode je najpomembnejši javnozdravstveni ukrep. Povečalo se je število raziskav, ki proučujejo topikalne fluoride. Največ raziskav opisuje profesionalne pripravke s fluoridi in kreme za zobe s fluoridi za domačo uporabo. Uporaba kreme za zobe s fluoridi je varen in uspešen javnozdravstveni ukrep v preventivi kariesa, zato ga priporočamo za celotno populacijo. Rezultati o drugih oblikah topikalnih fluoridov so nezadostni, zato jih ni mogoče označiti kot pomembne javnozdravstvene ukrepe.*

***Zaključki**. Vloga fluoridov se je spremenila v skladu z znanjem o njihovem delovanju. V preteklosti najpomembnejšemu preeruptivnemu delovanju se je pridružilo razumevanje o posteruptivnem učinku fluoridov. Obstajajo jasni dokazi o učinkovitosti tako sistemskih kot topikalnih fluoridov.*

Ključne besede:
fluoridi, javno zobozdravstvo, preventiva kariesa, epidemiologija

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1 INTRODUCTION

Caries is a widespread oral disease (1). The prevention of caries with fluoride/s (F) has been proven to be an effective public health measure (PHM), and it is considered to be one of the ten greatest achievements of PH in the 20th century (2).

Fluorides are salts of the chemical element fluorine (3). People can be exposed to F in various ways: through air, soil, water, or beverages (1).

Black and McKay first recognised the preventive effect of F in Colorado Springs at the beginning of the 20th century (4). In 1931, Churchill identified a higher concentration of F in Colorado Spring's water (5). This discovery encouraged Dean to perform several population interventions with water fluoridation (WF) to prevent caries at the population level (6). His work served as a basis for decades of population caries prevention by using WF. Systemic F had been widely recommended until the 1970s, when the new concept of understanding caries and F anticariogenic action was introduced (7). It was established that F controls caries mainly through its topical effect (3, 8). The topical mechanism is achieved either with systemic F or with topical F. In contrast, WF is a major factor in preventing pit and fissure caries, the most common site of tooth decay (9, 10).

According to the described historical facts, F are still divided into two groups according to their form of action, namely: systemic and topical (local). Systemic F (F water, milk or salt, F supplements as tablets, drops or lozenges) are ingested and incorporated into tooth enamel during tooth development. They also provide some topical protection of already erupted teeth as a reservoir of F in oral mucosa and saliva (12). Topical F (F toothpaste, mouthwashes, varnishes, gels, foams, slow-release F devices) reduce demineralisation of the enamel, promote remineralisation, and disable the metabolism of the bacteria in dental plaque (8, 11).

After nearly 100 years, F remains an important research subject. The availability of many different forms of F in the modern developed world and their cumulative preventive effect are among the most urgent topics in dentistry.

The aim of our study was to chronologically analyse various PH F uses in caries prevention.

2 METHODS

2.1 Search Strategy

We systematically searched the PubMed database on the preventive role of F in PH, published from 1984 to 2014. The search was conducted in February 2015, and revised in September 2015.

The search process consisted of four steps (Figure 1), namely:

1. A basic search with included Medical Subject Headings (MESH): fluorides, dentistry, community health. We specified the search by reviewing the articles that also included the following words in the title or abstract: caries and preventive or prevention (Step 1).
2. The first screen was performed using the following three inclusion criteria: full text availability; written in English; narrative review or systematic review or meta-analysis as the type of the articles (shorted: reviews) (Step 2).
3. In the second screen, the article selection was narrowed down by reading abstracts from the selected reviews in the first search (Step 3).
    a. We only included articles with the main theme of the preventive/community health role of F. We excluded reviews about the mechanism of action, F-containing materials, dental fluorosis, and the effect of F on bone remodelling, caries management with other chemical products or sealants.
    b. Since none of the seven reviews published before 1984 met the criteria for inclusion, we determined the observed window of time as being from 1984 until the present.
4. After the second screen selection, three assessors independently read full-text articles and confirmed or declined the inclusion. Twenty-eight reviews met all our inclusion criteria, and further data were extracted and analysed. The hand-search of the bibliography resulted in the inclusion of twelve reviews (Step 4).

2.2 Data Description

Qualitative methodology was used for the article analysis. In the first step, the relevant articles were extracted in the form of a specifically designed table: the described forms of F use (systemic, topical or both), diversity of the described F agents, and observed population group. In the second step, we summarised the main results on various uses of F as preventive agents over the previous 30 years.

3 RESULTS

3.1 Search Strategy

According to the described search strategy, 40 relevant articles were read in full (Figure 1).

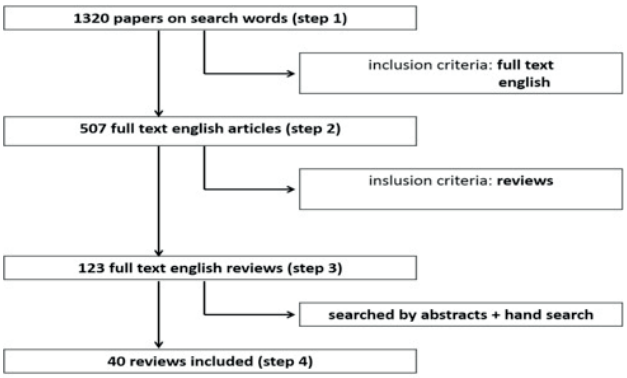

Figure 1. According to the described search strategy, 40 relevant articles were read in full (Figure 1).

In terms of content, articles were analysed according to the described F preventive agent(s) (Table 1).

3.2 Analysis by Periods of Observation

We arranged the reviews into three periods according to publication dates (Figure 2).

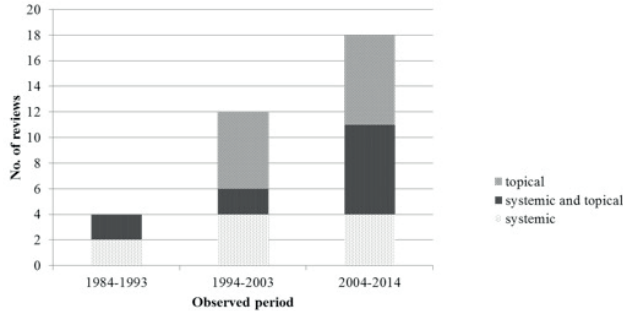

Figure 2. The number and substantive set of reviews about the preventive role of fluoride according to the publication date (PubMed, 1984-2014).

Nineteen different F interventions were observed in the selected reviews. The representation by their described F agents in caries prevention is shown in Figure 3 (systemic use) and Figure 4 (topical use).

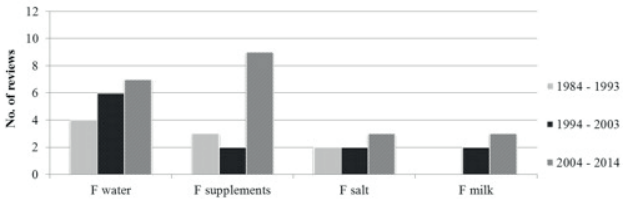

Figure 3. The number of reviews on systemic fluorides in the observed periods according to the form of use and publication time (F – fluoride/s).

Table 1. Results of the reviews by year of publication and described form of the use of F preventive agents (PubMed, 1984-2014).

First author, year of publication	Review type	W	T	S	M	I	P	V	G	R	D	To	Co
Sheiham, 1984	NR	•	•	•			•			•			
Hargreaves, 1990	NR	•											
Horowitz, 1990	NR	•											
Manji, 1990	NR	•	•	•								•	
Lewis, 1994	NR	•											
Levy, 1994	NR	•	•			•							
Johnston, 1994	NR							•	•				
O'Mullane, 1994	NR	•		•	•	•							
Bowen, 1995	NR	•					•				•		
Limeback, 1999	NR	•											
Marinho, 2002	MA								•				
Marinho, 2002	MA							•					
Marinho, 2003	MA						•						
Marinho, 2003	MA									•			
Twetman, 2003	MA						•						
Warren, 2003	NR	•	•	•	•	•							
Axelsson, 2004	SR												•
Fejerskov, 2004	NR	•	•									•	
Marinho, 2004	MA												•
Marinho, 2004	MA												•
Petersson, 2004	MA							•					
Twetman, 2004	SR									•			
Yeung, 2005	SR				•								
Bonner, 2006	SR										•		
Griffin, 2007	SR	•										•	
Pizzo, 2007	SR	•											
Ismail, 2008	SR		•										
Kumar, 2008	NR	•	•	•			•	•		•			
Pessan, 2008	SR										•		
Espelid, 2009	SR		•	•	•								
Marinho, 2009	SR				•		•	•	•	•	•		
Toumba, 2009	SR										•		
Carvalho, 2010	SR							•					
Walsh, 2010	MA						•						
Wong, 2011	SR						•						
Lam, 2012	NR	•	•				•	•	•	•			
Petersen, 2012	NR	•	•	•			•	•	•	•			
Marinho, 2013	MA							•					
Chong, 2014	SR										•		
Moyer, 2014	SR	•	•					•					

Legend: NR – narrative review; SR – systematic review; MA – meta-analysis; W – water fluoridation, T – fluoridated tablets, drops, lozenges; S – fluoridate salt; M – fluoridate milk; I – ingested fluorides in food, drinks or as dental agents; P – toothpaste with fluorides; V – fluoride varnishes; G – fluoride gels; R – fluoride mouthwashes/mouth rinses; D – slow-release fluoride devices; To – topical fluorides in general; Co – combination of various fluoride agents.

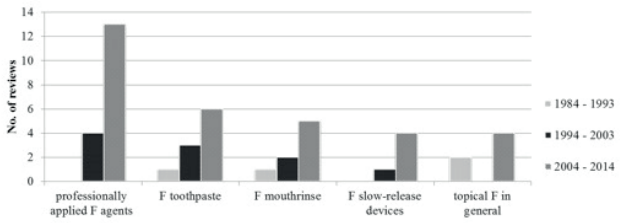

Figure 4. The number of reviews on topical fluorides in the observed periods, according to the form of use and publication time (F – fluoride/s).

In Figure 5, we arranged the reviews according to the observed population. Eight reviews did not specify the group of interest according to age. In terms of using different F interventions, systemic F were observed in all age groups, but for the analysis of topical effects in adults and the elderly, the data were too limited or non-existent.

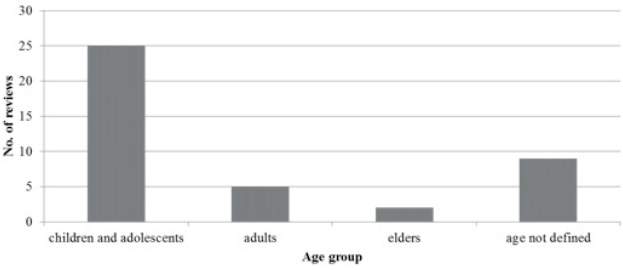

Figure 5. The distribution of the reviews about the preventive role of F according to the observed population group.

3.3 Results of Contents by Periods

3.3.1 The Period between 1984 and 1993

In the first observation period, only four relevant reviews were published. None of them focused on the topical F only and among the topical F agents; only Sheiham described toothpaste and mouth rinse (13). Hargreaves (14) and Manji (15) mentioned the possibility of topical F, but also warned about their insufficiently researched effects. All four reviews describe WF as an effective PHM of prevention of caries with 27-35% decline in caries prevalence in the exposed population, in comparison to the unexposed (13-16). The use of topical F (toothpaste, mouthwash) was reported to reduce the incidence of caries, especially during teeth eruption (13, 15).

Horowitz reported a lack of evidence on the combined use of systemic and topical F (16). He also reported that the use of topical products had helped to produce caries reduction in areas without WF and, thus, diminished the absolute differences in caries prevalence between WF and non-WF areas (16).

Nevertheless, Hargreaves emphasised the lack of knowledge in recommending different F agents according to the age and development of the individual for maximum effect with minimum risk (14).

3.3.2 The Period between 1994 and 2003

Between 1994 and 2003, twelve relevant reviews were published. Four described systemic F; six described topical F; and the remaining two described both forms of use.

Levy (17) presented a new concept of prevention with F: the concept of optimal intake of F. Limeback reported that extensive use of systemic F might have masked the topical action of systemic F (18). Moreover, he wrote that the topical action could be even more important than the systemic effect (18).

More than 50 years of experience with water fluoridation showed a reduction in the burden of caries among the exposed population in many countries (19). Differences in DMFS (decayed, missed, filled surfaces) were smaller than in the past; therefore, Lewis estimates WF as a relevant PHM in poor communities, but unnecessary in countries with low prevalence of caries (20). As an alternative, considerably less known or studied systemic F interventions were proposed (F supplements, fluoridated salt, milk or sugar) (17, 19-22).

Studies on F supplements revealed significant limitations: poor patient compliance and inappropriate prescription (17, 22).

When designing prevention programmes or individual counseling regarding F, the total intake of F should be taken into account, which also means taking into account F ingested with food, drink and oral care products (accidental) (17, 22).

During this period, several authors described the effectiveness of topical uses of F. Gels were the favourite choice of the operators (23). Their estimated efficiency was 21-26% in a population unexposed to other F treatments (24). The prevented fraction (PF) of F varnishes and F mouthwashes was high in primary and permanent deciduous teeth, although no significant association was found between the estimates of D(M)FS PFs and baseline caries or background exposure to F (25-27).

The reviews and meta-analysis confirmed that the effect of fluoride toothpaste is higher with higher F concentration and frequency of use (21, 28, 29). Moreover, Twetman found only limited evidence for anti-caries differences between low-fluoride and standard toothpaste (28). To summarise, they all concluded that the preventive action of F toothpaste when brushing every day in young permanent teeth was based on strong evidence (28, 29).

3.3.3 The Period between 2004 and 2014

We identified 21 reviews published in the last decade. Systemic F were described in four reviews, topical F in eleven reviews, and seven reviews included both.

In spite of rising numbers of evidence-based reviews on the importance of the topical effect of F, systemic F remained an important anti-cariogenic measure, especially in terms ofcost-effectiveness (30). In 2006, over 300 million people in 39 countries lived in WF-supplied areas (31).

F milk and F salt had shown some preventive effect, but they are difficult to prescribe in correctdoses, and scientific evidence for assessing their effect is insufficient to draw conclusions (30, 32-35).

Nevertheless, of all systemic F, the safety and efficiency of F supplements seem to be an issue of some debate among professionals (36). Reduction in caries increment differs a lot between different age groups, and in terms of the duration of action, proper supervision and motivation. The most popular form of professionally applied F agents in the reviews was F varnishes. The lack of evidence-based studies makes it impossible to determine whether the concentration in the varnish affects its prophylactic activity (37-39). There is a moderate benefit in preventing future caries with F varnish application in all children starting at the age of eruption of primary teeth (40, 41). F varnish is appealing for PH programmes, because it is easily incorporated (30, 37).

The two reviews mentioned F tooth-mousse and F gels as alternative forms of professionally applied F agents (33, 38).

In countries where F toothpasteis wide spread, it is the most relevant and accessible method of topical F (38, 42). More than 500 million people around the world use F toothpaste, and its effectiveness is well documented (34, 38, 42).

The efficiency of F toothpaste is increased with supervised brushing, a higher concentration of F, frequent use, and in higher-risk patients (29, 30, 33, 43). The evidence of the combined use of F toothpaste and another F agent remains limited; however, simultaneous use results in caries reduction compared with F toothpaste use alone (34, 38, 44-46). In comparison with gels or mouthwashes, toothpaste appears to have similar effectiveness for caries prevention in children (46).

Weekly rinsing under supervision has been proved to be effective and even an alternative to operative applied or unsupervised home use of F (30, 33). For the relatively new F agents, slow-release F devices, only a few studies are available, but they have shown a caries reduction capacity (47-50).

Although children and adolescents are still usually the population of interest, Griffin found that fluorides are effective among all adults, and the implementation of fluoride programmes should also serve this population (51).

4 DISCUSSION

The prevention of caries with F has been a significant PH intervention since it started with the implementation of F in drinking water. In our study, we have presented the shift from the traditional to the modern understanding of F use in caries prevention.

Since 1984, when the first review of literature about PH fluoride prevention was conducted, fluorides have remained one of the milestones of caries prevention. Nevertheless, the recommendations and PH programmes have changed, and the number of published reviews about F prevention in the field of PH is constantly increasing.

In the first observed decade (1984-1993), the main points of interest were systemic F. In the second decade (1994-2003), only half of the reviews were about systemic F. In the latest decade, only a minority of the reviews focused on systemic F, with half of the reviews during 2004-2014, describing topical F as a PHM. Most of the research on F prevention was done in groups of children and adolescents. It is thought that F use in caries prevention is also an important measure among adults and especially among the elderly.

In 2004, Fejerskov described the shift from “caries resistance concept” to understanding caries to be a multifactorial disease, following the ecological shift in the tooth-surface biofilm (7).

At first, only WF seemed to be a major PHM, but in recent decades, topical F, especially widespread and very efficient F toothpaste, are considered as possible PHM, especially in populations with low caries increment.

Although all the reviews agree that community WF is safe and effective in caries prevention, its role has been combined with the use of topical F as PHM. WF is cost saving and still recommendedby the US Community Preventive Services Task Force (41) and recent guidelines (52–54). Even in an era with a widespread availability of fluoride from other sources, studies prove that water fluoridation continues to be effective in reducing dental decay (55, 56). WF is believed to be a major factor in preventing pit and fissure caries, the most common site of tooth decay (9, 10). Maximal caries-preventive effects of water fluoridation are achieved by exposure to optimal fluoride levels both pre- and post-eruptively (55). Moreover, the latest Cochrane review on WF from

2015, concluded that there is insufficient information to determine the effect of stopping water fluoridation programmes on caries prevalence (57).

The post-eruptive effect became more important with the decreasing severity of caries attack (58). Efforts of the PH preventive programme for oral health should be directed towards the maintenance of a permanent low concentration of fluoride in the mouth in as many people as possible (3). Even the current guidelines recommend fluoride toothpaste as the basic fluoride regimen for the majority of European communities (52).

In Slovenia, the level of F in the water supply is below 0.2 ppm (59), which is below the level of significance for WF. In addition, artificial fluoridation has never been implemented. In the 1970s, the topical application of a 2% sodium fluoride in school-age children (7–15 years) was introduced, which was changed, in the 1980s, to the application of aminofluoride gel and the widespread use of toothpaste with fluoride (60). Today, preventive dental care in Slovenia follows updated guidelines on the use of F in Europe (52). We wish to (re-)establish a modern, scientific-based collective approach to F use in caries prevention, which is currently, unfortunately, based on the commitment of individuals or smaller professional groups, working in dental (prevention) offices.

Our article presents the F use in caries prevention through the perspective of PH. Independently of the described form of F use, we highlighted the most significantfindings about all forms of F use in order to give the reader the best perspective on the field. A comprehensive knowledge on fluorides is described. At the same time, the comprehensive approach to our topic is also a restriction. We chose to limit our study to review articles; consequently, we could not assess the strength of evidence-based facts for each form of use.

Our review showed that the use of F in caries prevention is very active. It is important to improve the evidence ability for different forms of use, and to research the cumulative effects of using different forms of F. The effect of different F agents should be measured in various ages and social environments. Furthermore, the need for the systematic use of F in societies with low caries prevalence should be scientifically assessed. More research should also be done in the older population groups, not focusing only on children and adolescents.

5 CONCLUSION

In contrast to traditional systemic forms of F as PHMs, nowadays, the use of topical F is becoming the primary approach. As the operative treatment of caries is very expensive, and F has proven to be efficient in caries reduction, it remains recommended as the standard for caries prevention. At the same time, it is necessary to promote oral health also at other levels (good oral hygiene, healthy nutrition, regular check-ups, being included in oral preventive programmes).

CONFLICT OF INTEREST

The authors declare that no conflicts of interest exist.

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ETHICAL APPROVAL

Review articles were studied.

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Navedite imena vseh avtorjev, v primeru, da je avtorjev šest ali več, navedite prvih šest avtorjev in dodajte et al.

PRIMERI ZA CITIRANJE LITERATURE

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12. Mendels P. Textbook publishers extend lessons online. Available Sept 23, 1999 from: http://www.nytimes.com/library/tech/99/09.

TABELE

Tabele v angleškem jeziku naj bodo v besedilu prispevka na mestu, kamor sodijo. Tabele naj sestavljajo vrstice in stolpci, ki se sekajo v poljih. Tabele oštevilčite po vrstnem redu, vsaka tabela mora biti citirana v besedilu. Tabela naj bo opremljena s kratkim angleškim naslovom. V legendi naj bodo pojasnjene vse kratice, okrajšave in nestandardne enote, ki se pojavljajo v tabeli.

SLIKE

Slike morajo biti profesionalno izdelane. Pri pripravi slik upoštevajte, da gre za črno-beli tisk. Slikovno gradivo naj bo pripravljeno:

- črno-belo (ne v barvah!);
- brez polnih površin, namesto tega je treba izbrati šrafure (če gre za stolpce, t. i. tortice ali zemljevide);
- v linijskih grafih naj se posamezne linije prav tako ločijo med samo z različnim črtkanjem ali različnim označevanjem (s trikotniki, z zvezdicami...), ne pa z barvo;
- v grafih naj bo ozadje belo (tj. brez ozadja).

Črke, številke ali simboli na sliki morajo biti jasni, enotni in dovolj veliki, da so berljivi tudi na pomanjšani sliki. Ročno ali na pisalni stroj izpisano besedilo v sliki je nedopustno.

Vsaka slika mora biti navedena v besedilu. Besedilo k sliki naj vsebuje naslov slike in potrebno razlago vsebine. Slika naj bo razumljiva tudi brez branja ostalega besedila. Pojasniti morate vse okrajšave v sliki. Uporaba okrajšav v besedilu k sliki je nedopustna. Besedila k slikam naj bodo napisana na mestu pojavljanja v besedilu.

Fotografijam, na katerih se lahko prepozna identiteta bolnika, priložite pisno dovoljenje bolnika.

MERSKE ENOTE

Naj bodo v skladu z mednarodnim sistemom enot (SI).

KRATICE IN OKRAJŠAVE

Kraticam in okrajšavam se izogibajte, izjema so mednarodno veljavne oznake merskih enot. V naslovih in izvlečku naj ne bo kratic. Na mestu, kjer se kratica prvič pojavi v besedilu, naj bo izraz, ki ga nadomešča, polno izpisan, v nadaljnjem besedilu uporabljano kratico navajajte v oklepaju.

UREDNIŠKO DELO

Prispelo gradivo z javnozdravstveno tematiko mednarodnega pomena posreduje uredništvo po tehnični brezhibnosti v strokovno recenzijo trem mednarodno priznanim strokovnjakom. Recenzijski postopek je dvojno slep. Po končanem uredniškem delu vrnemo prispevek korespondenčnemu avtorju, da popravke odobri in upošteva. Popravljen čistopis vrne v uredništvo po spletni aplikaciji Editorial Manager. Sledi jezikovna lektura, katere stroške krije založnik. Med redakcijskim postopkom je zagotovljena tajnost vsebine prispevka. Avtor dobi v pogled tudi prve, t. i. krtačne odtise, vendar na tej stopnji upoštevamo samo še popravke tiskarskih napak. Krtačne odtise je treba vrniti v treh dneh, sicer menimo, da avtor nima pripomb.

V uredništvu se trudimo za čim hitrejši uredniški postopek. Avtorji se morajo držati rokov, ki jih dobijo v dopisih, sicer se lahko zgodi, da bo članek odstranjen iz postopka.

Morebitne pritožbe avtorjev obravnava uredniški odbor revije.

Za objavo članka prenese avtor avtorske pravice na Nacionalni inštitut za javno zdravje kot založnika revije (podpiše Pogodbo o avtorstvu in avtorskih pravicah). Kršenje avtorskih in drugih sorodnih pravic je kaznivo.

Prispevkov ne honoriramo in tudi ne zaračunavamo stroškov uredniškega postopka.

Avtor dobi izvod tiskane revije, v kateri je objavljen njegov članek.