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THE POPULATION'S PERCEPTION OF THE IMPACT OF IMPROPER DISPOSAL OF HOUSEHOLD PHARMACEUTICAL WASTE ON THE ENVIRONMENT IN THE SARAJEVO CANTON

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SUMMARY: Pharmaceutical waste, classified as hazardous medical waste, has no supervision or control when it comes to what is produced in households. Environmental factors, in addition to inherent factors, affect the health of the community, as a variable number of determinants that can mainly be influenced by the organized effort of society and the responsible behavior of the individual. The primary aim of the study was to examine whether the citizens of the Sarajevo Canton are aware that improper disposal of pharmaceutical waste endanger the environment, and to determine how citizens in the Sarajevo Canton dispose of household-produced pharmaceutical waste. The study was conducted using a questionnaire and included 425 respondents in the study. The results indicate that 290 or 68.2% of respondents believe that inadequate disposal of pharmaceutical waste produced in households adversely affects the environment. Two respondents did not answer the question about the method of disposal of this type of waste, so based on 423 answers we obtained information that 368 or 87.0% of respondents improperly dispose of pharmaceutical waste produced in households, of which 308 or 83.7% of respondents exclusively dispose it with the municipal waste, and only 55 or 13.0% of respondents properly dispose of this type of waste. Given that the uncontrolled disposal of communal and hazardous waste is of great importance to human health, it is imperative to continuously research and reach new knowledge to be able to react and minimize all risks of a potential public health problems.

Key words: *Sarajevo Canton, pharmaceutical waste, household, improper disposal, environmental pollution*

INTRODUCTION

Globalization has led to the fact that an important segment in protection of human health, plant and animal life, which is environmental protection, is very often neglected *(Baranašić et al., 2019)*.

Many of the health consequences of environmental pollution become visible only after a long period of time or occur as a result of chronic exposure *(Sofilić, 2015)*.

The use of pharmaceutical products is constantly increasing in modern times due to the increase and aging of the population, the production and market expansion and the emergence of new, unexplored diseases *(Bujas et al., 2013)*.

The presence and constant increase in prevalence of diseases such as obesity, diabetes, car-

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diovascular diseases, cancer and autoimmune diseases increases the consumption of certain pharmaceutical products *(OECD, 2019)*.

The aforementioned facts can be seen as an additional potential public health problem. Accumulation of medicines can cause larger or smaller amounts of pharmaceutical waste (hereinafter: PW) produced in healthcare institutions and households. The risk for environmental pollution and human health, as well as the preservation of plant and animal life becomes greater if this type of waste is not disposed of in the prescribed manner.

Bosnia and Herzegovina (hereinafter: BiH) is a developing country, but certain regulations have been established regarding environmental protection and the final categorization and disposal of waste based on the properties of waste substances.

It is the right of every human being to live in a healthy and environmentally friendly environment, and its duty to protect and improve the environment. Also, every person has the right to all information related to the environment, as well as the well-organized acquisition of knowledge *(Zakon o zaštiti okoliša)*.

Pharmaceutical waste (hereinafter: PW) represent a type of hazardous medical waste that requires mandatory separation from general waste and acceptable treatment from the point of origin to final disposal *(Pravilnik o upravljanju medicinskim otpadom)*.

It includes medications that have passed expiration date, have changed organoleptic properties or packaging, and simmilar *(Pravilnik o zbrinjavanju farmaceutskog otpada)*.

Hazardous waste is categorized based on its composition and necessarily contains one or more properties determined by the list of hazardous waste, which includes harmfulness, toxicity, carcinogenicity, infectiousness *(Briški, 2016)*.

Based on current regulations in BiH, hazardous waste produced in households should be collected separately to minimize the risks that can contribute to environmental pollution *(Zakon o upravljanju otpadom)*.

However, there are regulations, but there is generally no supervision over them, and in addition, regarding the issue of PW generated in households at the level of the state and Sarajevo Canton (hereinafter: KS), it has not been reliably determined about the quantities that are in question.

There are 2,000 illegal landfills in the territory of the Federation of Bosnia and Herzegovina. The sector that manages waste is not at a satisfactory level because data collection, monitoring and reporting in this sector is lacking *(Zavod za javno zdravlje FBiH, 2022)*.

Also in KS, in addition to the sanitary landfill, there is an unspecified number of smaller and larger illegal landfills. In these locations, the quality of the soil is unknown due to the lack of previous exploration, but there is certainly a potential for contamination because the waste is buried directly into the soil *(Enova d.o.o., 2017)*.

The landfill (Smiljevići) in KS only partially meets the requirements for sanitary landfills *(Zavod za javno zdravlje FBiH, 2022)*.

The harmful effects of the waste on the environment and human health are evident, and some of them are leachate water emissions that cause surface and underground pollution of the water and soil, while biogas emissions, the spread of particles, unpleasant odors, occupying space and changes in the natural environment should also be mentioned *(Enova d.o.o., 2017)*.

When it comes to the PW as a category of hazardous medical waste, the main reasons why the medication becomes unwanted by the patient or ultimately remains unused are a change in the dose or a change in prescribed medication, patient death, incomplete therapy or inappropriate use of medications by the patient (especially antibiotics) and discontinuation therapy due to side effects *(Singleton et al., 2014)*.

Most often, people store medicines at home to facilitate self-medication *(Constantino et al., 2020)*.

In many countries, as well as in BiH and KS, there are no legal authorities that would determine the entities responsible for collecting unwanted medications from residential areas. The regulati-

ons mainly apply to unused or expired medicines from healthcare institutions and pharmacies, but not from households *(Vieno e al., 2017)*.

In BiH, it is common for expired medicines from households to end up in landfills. Water is the best solvent in nature, and the solubility of the medication depends on its chemical composition. Landfills are unkempt, unsanitized, have no drainage and sealing systems, and the dissolution and decomposition of this type of waste leads to soil and groundwater pollution *(Suljić, 2021)*.

Rational consumption of medications, prescribing more environmentally friendly medicines or designing medicines that are benign and easily biodegradable, as well as disease prevention and the amount of packaging itself, are factors that influence to a certain extent the amount of generated PW *(Paut Kusturica et al., 2020)*.

Small home pharmacies can be very dangerous, however, if they are properly and separately collected, it is possible to dispose of old medicines so that they do not endanger health and lives and does not pollute the environment *(Pranjić et al., 2011)*.

Due to the increased consumption of antibiotics, the environment is contaminated with them. The benefits of antibiotics are indisputable, but one should take into account the fact that antibiotics in the environment have a high potential for maintaining, causing and spreading bacterial resistance, as well as a series of negative effects on the entire ecosystem *(Polianciuc et al., 2020)*.

Toxins from the environment interfere with hormone production and metabolism, and in the long term create biological conditions that make us more susceptible to cancer and other diseases *(Cohen, Jefferies, 2019)*.

Degradation products or metabolites of medicines represent a huge problem in the environment, due to their transformation into new compounds, which can be more toxic than the original compounds and can be more resistant to biodegradation and remain in the environment for a longer time *(Vrček, 2017)*.

In India, there is an increase in the incidence of lung cancer among non-smokers, which can be attributed to environmental exposure to various types of hazardous substances *(Shankar et al., 2019)*.

Expanding health education programs is key to raising awareness and changing the public view of safe storage and disposal of PW, considering the harmful effects and consequences that this type of waste can cause for human health and the environment *(Constantino et al., 2020)*.

Ensuring harmony between the family, local community, municipality, canton, entity and state is a prerequisite for an organized and humane state, and organized municipalities are the key elements in that chain *(Džaferović, 2019)*.

The development of the ecological awareness of citizens is a key factor that affects how and where PW will be disposed. Encouraging the awakening of ecological awareness and the fundamental principles of environmental protection is necessary from an early age *(Lukšić et al., 2019)*.

Based on the presented facts, the recognition of the problems and health risks, the main goal of this study was to investigate whether the citizens of the KS are aware that improper disposal of PW endanger the environment and to examine the actual methods of disposing of PW produced in households in the KS, as well as to determine the correlation between poor habits of disposal of PW produced in households and age, gender, level of education, and municipality of residence. Additionally, one of the objectives is to determine which group of medications citizens in the KS most commonly use. After identifying the problem and setting the objectives, the hypothesis guiding our research was" Citizens of the KS are aware that improper disposal of PW produced in their households adversely affects the environment, but poor habits contribute to the fact that in most cases this type of waste is disposed in an unacceptable manner".

MATERIALS AND METHODS

The research was conducted in BiH in the area of KS in the period August - September 2023. The Canton of Sarajevo consists of the city of Saraje-

vo and five neighboring municipalities, making a total of nine municipalities that belong to the KS. Eight municipalities were included in the research, because we did not have respondents from the municipality of Trnovo. The target group was all citizens of KS at the age of 18 years or older, and citizens under 18 were excluded. The minimum sample was determined based on the total number of residents older than 18 years of age in the KS, which is 384 respondents and is considered to have a 95% reliability.

The total number of respondents was 440, but due to incomplete data that was important for the analysis, 15 respondents were excluded, and the total sample was 425. The respondents included in the research were selected based on the random sampling method.

One of the inclusion criteria was that no more than one member of one household could be surveyed. The data collection was conducted using the method of surveys and interviews using questionnaires. The study used an original author's questionnaire created based on a review of professional and scientific literature, as well as expected evidence in practice, as well as available data from similar studies. The questionnaire was created as an online or paper form, which was filled out by colleagues in the field during the interviews with respondents. The questionnaire consisted of eleven questions, five open-ended questions, which related to the socio-demographic characteristics, and six predefined single choice questions, which related to general assumptions about where the PW produced in the household and the opinions of the population regarding the statements related to the consequences of disposing of the PW in an unacceptable manner. In the first group of questions, there was a sub-question related to the size of the respondent's household. We did not present the data through the results, but as an orientation for the sake of the sample itself, because we can assume that each member of the household increases the sample and makes it more representative. Four groups of collaborators participated in the field, who previously received a short training on how to conduct and document the interview. The online questionnaire was available to respondents through the Google Forms electronic application. The respondents voluntarily agreed to participate in the survey on the condition that they remain anonymous. Surveying in the field was suspended at the start if the respondent verbally declared that he had never had the opportunity to produce a larger or smaller amount of PW in their household. For the sake of data validity, the assumptions of what the respondent would do if he found themselves in a situation where a medicine or anything that could be classified as PW expired in their home pharmacy were not taken into account, and we also excluded. We surveyed 187 respondents through an online questionnaire, while 238 respondents were included in the face-to-face interview.

Statistical analysis

Results are presented in form of tables and charts by the number of cases and percentage. Risk analysis in the manner of pharmaceutical waste disposal, according to socio-demographic characteristics was tested using chi-square test at the 95% confidence level, and test results with $p<0.05$ were considered to be statistically significant.

The analysis was performed using statistical software for biomedical studies MedCalc v12.0 (Antwerp, Belgium).

RESULTS

The study included a total of 425 participants, of which 157 (36.9%) male and 268 (63.1%) female. The largest number of respondents were between the age of 35 and 45 years, 115 (27.1%) and 113 (26.6%) 25-35 years old. 157 (36.9%) men and 268 (63.1%) women participated in the research. Most of the residents of the municipality of Ilidža were included in the survey (189 or 44.5%). When it comes to education, we had roughly the same number of highly educated respondents and respondents with a lower level of education.

Out of the total number of participants (N = 425), 389 (91.5%) responded to the question about household size, with the most common being four-member households (in 142 cases) and three-member households (in 115 cases).

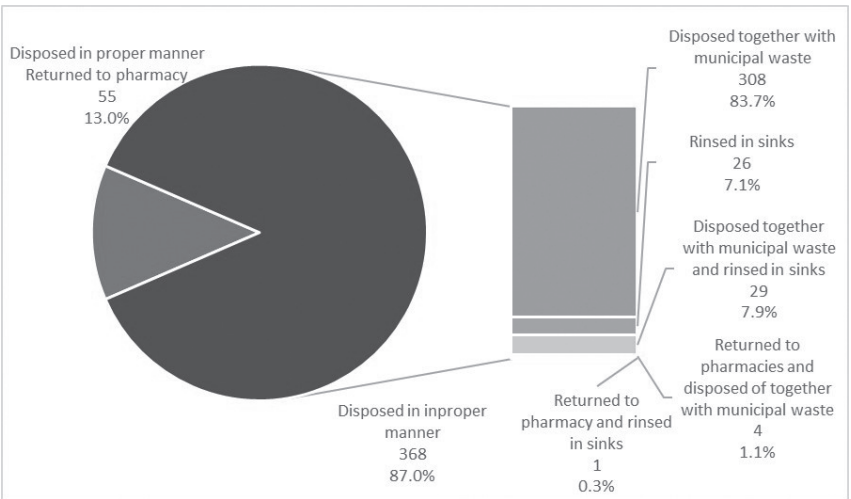

Figure 1. Overview of PW disposal method (n=423)
Slika 1. Pregled načina odlaganja FO (n=423)

Of the total number of respondents (N = 425), two did not answer the question about the method of disposal of PW, so from the available answers (N = 423), 55 (13.0%) respondents return PW to pharmacies and 368 (87.0%) respondents improperly dispose of PW, of which 308 (83.7%) of respondents dispose of PW exclusively together with municipal waste (Figure 1); *(Authors based on research)*.

Of the total number of participants (n = 370) who did not dispose of pharmaceutical waste properly, 10 did not state a reason, so based on the total number of participants (n = 360) who stated a reason, 270 (75.0%) chose the easiest way to dispose of pharmaceutical waste, while 72 (20.0%) claimed that pharmacists were reluctant to accept waste (Table 1).

Analysis of participants who returned pharmaceutical waste to pharmacies showed, through chi-square test, a significant difference ($p < 0.05$) based on gender, age, and municipalities, but not based on education level. These differences reflected a significantly higher rate of women (25.5%) returning pharmaceutical waste to pharmacies compared to men (5.6%). Regarding age, the elderly, aged over 65 years, returned pharmaceutical waste to pharmacies most frequently, in 21.4% of cases, while those aged 35 to 45 years returned it least frequently, in 7.8% of cases. According to municipalities, participants from Novi Grad municipality most frequently returned pharmaceutical waste to pharmacies, at 21.4%, while those from Ilijaš municipality returned it least frequently, at 0% (Table 2).

Table 1. Reason for disposal of the PW together with municipal waste (n=360)

Tablica 1. Razlog odlaganja PW-a zajedno s komunalnim otpadom (n=360)

	N	%
Pharmacy is far from the place of residence	13	3.6
Pharmacists unwillingly accept the waste	72	20.0
The simplest way of disposal was chosen	270	75.0
Pharmacists unwillingly accept the waste and the simplest way of disposal was chosen	4	1.1
The simplest way of disposal was chosen and pharmacy is far from the place of residence	1	0.3
Total	360	100.0

Table 2. Comparison of respondents who return the PW to pharmacies according to socio-demographic characteristics

Tablica 2. Usporedba ispitanika koji vraćaju PW u ljekarne prema sociodemografskim karakteristikama

		They return pharmaceutical waste to pharmacy		Other disposal methods		Totally		$\chi 2$ p
		N	%	N	%	N	%	
Gender	Male	15	5.6	253	94.4	268	63.1	32.989
	Female	40	25.5	117	74.5	157	36.9	0.0001
Age	18-25 years	5	13.2	33	86.8	38	8.9	28.963 0.0001
	25-35 years	13	11.5	100	88.5	113	26.6	
	35-45 years	9	7.8	106	92.2	115	27.1	
	45-55 years	11	14.7	64	85.3	75	17.6	
	55-65 years	11	19.6	45	80.4	56	13.2	
	Above 65 years	6	21.4	22	78.6	28	6.6	
Education	SSQ and ES	26	13.1	172	86.9	198	46.6	0.001 0.972
	TYPSSE or UQ*	29	12.8	198	87.2	227	53.4	
Municipalities	Vogošća	1	7.7	12	92.3	13	3.1	14.806 0.0387
	Centar	4	19.0	17	81.0	21	4.9	
	Hadžići	1	12.5	7	87.5	8	1.9	
	Ilijaš	0	0.0	5	100.0	5	1.2	
	Stari Grad	1	4.5	21	95.5	22	5.2	
	Novo Sarajevo	2	3.6	53	96.4	55	12.9	
	Novi Grad	24	21.4	88	78.6	112	26.4	
	Ilidža	22	11.6	167	88.4	189	44.5	
Total		55	12.9	370	87.1	425	100	

Source: Authorsbased on research
*SSQ = Secondary School Qualifications
ES = Elementary School
TYPSSE = Two-Year Post Secondary School Education
UQ = University Qualifications

Figure 2 shows that out of the total number of participants (n = 425), 290 (68.2%) participants believe that inadequate disposal of pharmaceutical waste causes air, water, and soil pollution, 38 (8.9%) believe it does not, and 97 (22.8%) are unsure. From the baseline (n = 425), 194 (45.6%) participants believe that inadequate disposal of pharmaceutical waste contributes to the occurrence of cancerous diseases, 47 (11.1%) believe the statement is incorrect, and 184 (43.3%) respondents answered that they do not know. Also, 409 (96.2%) participants would support preventive programs related to pharmaceutical waste (Figure 2); *(Authors based on research)*.

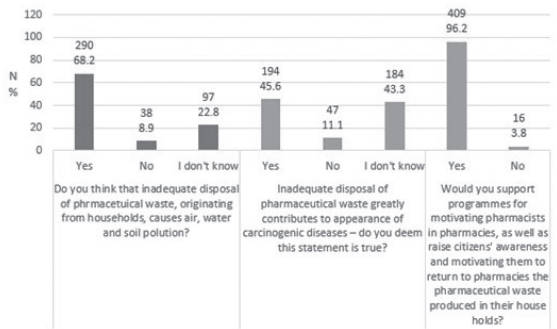

Figure 2. Overview of the respondents' answers (n=425)
Slika 2. Prikaz odgovora ispitanika (n=425)

Out of the total number of participants (n = 425), 283 (66.6%) accurately answered the question about the most commonly used medications in households. There was a total of 346 responses because some participants listed multiple types of medications. Analgesics were most commonly mentioned in 139 (49.1%) cases, antibiotics in 133 (47.0%), and antipyretics in 74 (26.1%) cases (Figure 3); (Authors based on research).

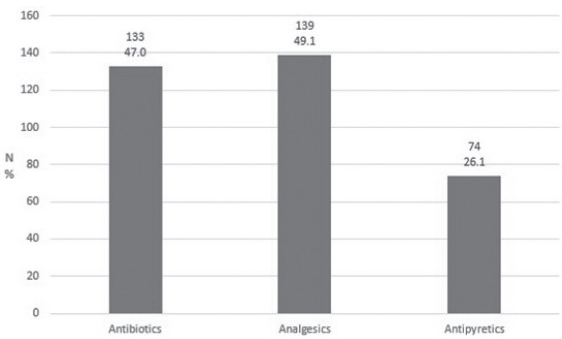

Figure 3. Type of medicinsesmost frequently used by the respondents (n=283)
Slika 3. Vrsta lijekova koju najčešće koriste ispitanici (n=283)

DISCUSSION

After the identification of the problem and the proposed hypothesis, which we confirm based on the obtained results that in the KS the PW is returned to pharmacies in only 55 (3.0%) cases, while it is most often disposed of together with municipal waste in 308 (72.8%) cases. Since we have not had previous studies in this area on the same topic, we will compare the results with the results of the studies on the same or similar topic from other regions. Although these are rough estimates, it is still a worrying fact that about 200 tons of pharmaceutical waste is disposed of in BiH, and of the total amount, 90.0% is generated in households, which ends up in landfills and sewers, and finally ends up in waterpaths *(EKO Apoteka, 2019)*.

At the territory of the Federation of Bosnia and Herzegovina, which also includes the KS, a study was conducted (2021-2022) for examination of the safety of methods of final disposal of hazardous medical waste in health care institutions. The results showed that there was a significant improvement in the medical waste management system compared to the study conducted in 2011-2012 on the same issue in the same area. Some of the elements of improvement are that pharmaceutical waste is disposed of in special dedicated rooms that are covered, marked, provided only for this purpose and locked. A plan has been defined on the basis of which this type of waste is transported and destroyed in other countries by authorized companies on the basis of signed contracts. It was also concluded that despite certain improvements that have been achieved on a ten-year level, PW from healthcare institutions still represents a risk to human health, and it refers to the part that ends up in landfills and sewers *(Fond za zaštitu okoliša Federacije BiH, Zavod za javno zdravstvo Federacije BiH, Izvještaj 2021-2022)*.

In BiH, the shortcomings in the matter of waste disposal are particularly pronounced in rural areas and refer to irregular collections, especially in Roma settlements. Many Roma families make their income on the basis of collecting and selling waste, and from the aspect of health, the risk becomes greater *(Strambo et al., 2021)*.

Every year, 1.2 million tons of municipal waste is produced in BiH. Although there has been a large emigration of the population in recent years, the production of municipal waste has increased by 6% *(European Environment Agency, 2021)*.

According to the estimate from 2021, in KS the 49.7% of population was at working age *(Strategy of Demographic Development of Sarajevo Canton, 2022)*, a data that indicates large proportion

of the population under 15 and over 65 years of age, where a higher consumption of medicines is certainly expected, and therefore, greater production of PW.

In our study, the largest share was respondents aged 35 to 45 years, 115 of them (27.1%) and 113 (26.6%) of 25–35-year-olds, so often use of antibiotics was expected, as indicated by the results and which pose the danger if the parents handle them carelessly, interrupt the therapy and dispose the remaining dosages in an improper manner. We presented three types of medicines, which the respondents stated that they use most often in their households, namely analgesics in 139 (49.1%) cases, antibiotics in 133 (47.0%) and antipyretics in 74 (26.1 %). Most analgesics are characterized as a low-risk group of drugs for the environment, except for diclofenac, an analgesic with a high risk for the environment *(Villen et al., 2023)*.

Diclofenac and ibuprofen were detected in traces in public wastewater systems, underground and surface water. It becomes dangerous by entering the food chain as they are transmitted back to humans, animals and plants *(Muriithi Nyagah et al., 2020)*.

Also, we came to the data that PW is most often returned to pharmacies by respondents who are older than 65 years (21.4%).

In a survey conducted in the area of the city of Trebinje *(2021)*, which included 250 respondents, 80.0% of respondents dispose of PW together with municipal waste, which is comparable to our data, 82.0% of respondents state that they would be happy to dispose of PW in a safe manner, but without additional financial burdens, 89.0% of respondents do not think that citizens are sufficiently informed about the harmful effects of pharmaceutical waste, and 78.0% of respondents confirmed that promotion and education measures are necessary when it comes to environmental awareness of citizens, from of which 30.0% of respondents believe that the introduction of certain legal regulations is also necessary, due to the weak awareness of citizens and poor habits that are difficult to change *(Međunarodni centar za promociju ljudskih prava, 2021)*.

Our results showed that the perception of the population in KS is significantly better compared to the perception of the population in Trebinje, where 290 (68.2%) of the respondents believe that the unacceptable disposal of PW leads to environmental pollution, 194 (45.6%) of the respondents believe that it contributes to the occurrence of cancer, but still 270 (75.0%) respondents choose the simplest way to dispose of this type of waste, and 72 (20.0%) respondents complain that pharmacists are reluctant to accept returns. Also, a large number of respondents (409 or 96.2%) would support various programs on the problem explored, which include the necessary motivation of pharmacists.

Based on the results of the study conducted in Portugal on 454 respondents, 72.0% of respondents return PW to pharmacies, and we see that it is not impossible to establish an appropriate system where the key links are the local community, citizens and pharmacists. The importance of education and reducing the quantity in packaging of the medicine itself is emphasized. The results of the study were significantly influenced by gender, age and place of residence, for the adoption of positive habits, but not by the level of education *(Veiga et al., 2023)*.

Also, our results are comparable with the results of the study conducted in Portugal, because the influence of the factors that contribute to the creation of negative or positive habits regarding the disposal of PW was shown to be the same.

The implementation of education programs on the disposal of PW generated in households achieves a great effect, especially when the campaign is aimed at a smaller community, as shown by the results of the study from Turkey. Namely, after the implementation of various education programs, 1,121 respondents were examined, of which 46.5% of the respondents changed their poor habits regarding the disposal of PW produced in their households after the education, and what is even more important, they are ready to help other people to adopt this mode of conduct *(Akici et al., 2018)*.

In Australia, there has been a national program regarding the disposal of PW from households since 1998, and the results of a survey conducted in 2016 with 4,302 respondents showed that less than 18% had heard of the program, and that

most people dispose unwanted medicines with household waste or down the drain *(Bettington et al., 2018)*.

By all accounts, it is not enough just to establish and implement programs related to the explored topic, the key factor is to provide citizens with the opportunity to increase their level of knowledge and raise environmental awareness to a higher level through various education and informative programs, for example through the media.

In Germany, pharmacies are not obliged to take over unused medicines, there are no unique systems in this regard, but recommendations to citizens are promoted, and some pharmacies voluntarily accept PW and bear the costs of disposal *(Mehtonen et al., 2020)*.

In Sweden, PW return systems are relatively well developed and efficient, and citizen awareness is high at around 80%, which is probably influenced by the return systems themselves. Namely, in Sweden, on the basis of the medicines returned to the pharmacy, the citizen receives a certain bonus and is often rewarded. According to a 2018 report, 70% of unused medicines were returned to collection centers. Even in case of any deviation or invalidity of the data, it is certainly a healthy figure *(Mehtonen et al., 2020)*.

Poor policies at the state level as well as the economic situation itself influence the stagnation in a very important sector related to waste disposal. Citizens can greatly contribute to the preservation and reduction of all risks when it comes to environmental pollution in correlation with waste. Each individual should enrich its knowledge to such a level that he/she does not endanger the environment in which it lives with any of its actions or poor habits. The lowest administrative levels of the investigated area should primarily approach the removal, cleaning and rehabilitation of illegal landfills.

CONCLUSION

On the basis of the conducted survey and sublimated results, in this chapter we have presented the most important views as well as the limitations of the study.

The issue of the investigated problem must be put on the priority list of local communities and all administrative levels as soon as possible, and the most effective methods should be found in order to educate citizens in an appropriate way about the effects of improper disposal of medicines on the environment, as well as to raise awareness and change poor habits. Establishing a system, in order to bring the investigated problem under control, is a long-term process and it is very difficult to estimate the actual amounts of PW in order to put it under control. In the end, the key factors are citizens, investment in education programs, in order to develop awareness of changing poor and health-damaging habits.

The results of the study can encourage future researchers to delve deeper and with a greater coverage of respondents and regions into this current and very important public health topic.

The limitations of this study refer to the small time period of data collection, which was also reflected in the coverage. Also, the motivation of the respondents was not at a satisfactory level, so the research included only those respondents who voluntarily wanted to contribute without any additional stimulus.

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DECLARATION OF INTERESTS

"Authors declare no conflict of interest"

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PERCEPCIJA STANOVNIŠTVA O UTJECAJU NEPRAVILNOG ODLAGANJA FARMACEUTSKOG OTPADA IZ KUĆANSTAVA NA OKOLIŠ U SARAJEVSKOM KANTONU

SSAŽETAK: Farmaceutski otpad iz kućanstava, svrstan u opasan medicinski otpad, ne podliježe nadzoru ni kontroli. Okolišni čimbenici, pored inheretnih čimbenika, utječu na zdravlje populacije a sastoje se od mnoštva determinanti na koje organizirani napor društva i odgovorno ponašanje pojedinca mogu utjecati. Primarni cilj studije je ispitati jesu li stanovnici Sarajevskog kantona svjesni kako nepravilno odlaganje farmaceutskog otpada ugrožava okoliš te utvrditi kako to stanovništvo odlaže farmaceutski otpad iz svojih kućanstava. Studija je provedena uporabom upitnika, a uključivala je 425 ispitanika. Rezultati pokazuju da 290 ili 68,2 % ispitanika vjeruje da neodgovarajući način odlaganja farmaceutskog otpada nepovoljno utječe na okoliš. Dva ispitanika nisu odgovorila na pitanje o načinu odlaganja ove vrste otpada pa je iz 423 odgovora dobiven podatak da 368 ili 87,0 % ispitanika neispravno odlaže kućni farmaceutski otpad, od kojih 308 ili 83,7 % odlaže tu vrstu otpada isključivo s komunalnim otpadom, a samo ga 55 ili 13,0 % ispitanika ispravno odlaže. S obzirom da je nekontrolirano odlaganje komunalnog i opasnog otpada uvelike važno za ljudsko zdravlje, potrebno je neprestano istraživati i tražiti nova saznanja kako bi se reagiralo i svelo na najmanju mjeru sve potencijalne rizike za ljudsko zdravlje.

Ključne riječi: *Sarajevski kanton, farmaceutski otpad, kućanstvo, nepravilno odlaganje, zagađenje okoliša*

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