CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE

Faculty of Tropical AgriSciences

Analysis of Waste Management Situation in the Republic of Moldova – Comparison of Rural and Urban Areas

Master's thesis

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Declaration

I hereby declare that this thesis entitled "Analysis of Waste Management Situation in the Republic of Moldova – Comparison of Rural and Urban Areas" is my own work and all the sources have been quoted and acknowledged by means of complete references.

In Prague, …………………………   Signature: …………………………

Acknowledgement

I would like to express my sincere gratitude to all the people who were standing by me during my university studies and the thesis elaboration. Especially I would like to thank my diploma thesis supervisor, Ing. Tatiana Ivanova Ph.D., for her guidance, productive comments and suggestions but mainly for her tremendous help, support, patience and kind approach during the whole writing and submitting process. I would also like to thank her for encouraging me to write a manuscript which was accepted for publication in a journal with impact factor and which is being submitted as this diploma thesis. Another thanks belong to Dipl.-Ing. Alexandru Muntean for his important role and help with the research conduction in the Republic of Moldova. Last but not least, I would like to thank my mother and my brother who have always inspired me for their supportive role in my life, motivation and positive attitude they bring in time of need which was also during my university studies.

Kateřina Procházková prepared the manuscript, designed and carried out the survey, Tatiana Ivanova revised the manuscript and supervised the research, Alexandru Muntean carried out the survey.

Abstract

The existing waste management system in the Republic of Moldova is still in a developing stage and it faces some serious problems. Therefore, this research has been conducted and it focused on examination of waste management in Moldovan rural and urban areas. It described challenges connected to the Moldovan waste management issues such as unauthorized landfills, illegal dumps or insufficient public services. However, the main focus was given to comparison of waste management features between Moldovan urban and rural areas.

For the purpose of such comparison, a questionnaire survey about waste management characterization was run in the capital city Chisinau and a rural village Vorniceni in comparison. There were 98 respondents of this quantitative research in total. All data were sorted and subsequently analysed in statistical program SPSS.

The survey results showed substantial differences between waste management in Chisinau and Vorniceni. Even though the capital city has functional public service for waste collection, there are still issues regarding waste sorting. On the other hand, Moldovan rural areas often suffer from lack of any waste management at all. Specifically, Vorniceni has currently no public service of waste management, village residents rely on their own waste transport to nearby dumps and there are no possibilities of waste sorting and recycling.

Key words: solid waste, sorting, recycling, landfill, Chisinau

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GIZ   German Society for International Cooperation
ISWA   International Solid Waste Association
SPSS   Statistical Package for the Social Sciences
UNEP   United Nation Environment Programme

Analysis of Waste Management Situation in the Republic of Moldova – Comparison of Rural and Urban Areas

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1 Introduction

There is no doubt that the global production of waste is increasing. Facts which can be seen as the main causes of this massive waste expansion are high population growth and migration to cities. Other major causes are general economic and social development or enhancement of population living standards [1]. Another critical issue, except for the generated waste amount, is waste composition. The rate of municipal solid waste is 2 billion tons worldwide [2] and it is annually increasing by 8% [3]. Also there is an explosive growth of plastics representation in the waste composition. Since 1950 the amount of plastic waste increased by around 280 million tonnes [4]. Therefore, an effective and sophisticated waste management system is a must and a special attention should be paid to such a challenging matter [5].

Moldovan waste management system, considered as a system of a developing country, remains on the same level of development for the last 20 years [6] and it still faces problems such as environmental pollution, illegal dumping, landfill overloading, insufficient network of public services for waste collection, waste recycling or proper legislative framework [7]. Several shortcomings in Moldovan legislation can be observed in waste infrastructure on national and regional level, thus an institutional restructuring of legal regulations covering waste collection, waste disposal or recycling is needed [8]. Although solid waste management should fulfil basic minimum standards to protect the environment and even though there exist legal acts and government decisions dealing with environmental protection in Moldova. Such acts and decisions lack more thorough legislative or technical regulations in waste management system which is causing large environmental pollution. A considerable share of this pollution begins with insufficient basic sanitary standards of waste disposal places which are usually not met, mainly in Moldovan rural areas. Though not only regulations can change the situation regarding waste management in the Republic of Moldova, but also a special attention should be paid to the increase of awareness of waste management issues among the whole Moldovan society [9], because mainly ordinary citizens initiate new illegal dumps in places which are not secure anyway.

However, Moldova belongs to the group of developing countries with its GDP; it ranks among developed countries with its 540 kilograms of average annual municipal solid

waste production per capita [10]. This amount fits into the average of 521.95 to 759.2 kilograms of annually produced waste per capita in developed countries, on the other hand the average amount of annual waste production in developing countries is between 109.5 and 525.6 kilograms per capita [1]. There are approximately 3.98 million tonnes of waste which is annually generated in the Republic of Moldova [11] and subsequently disposed according to [7] in about 3 thousand illegal dumpsites all around the country from which approximately 473 landfills could not fulfil the environmental standards [12]. For comparison, the number of Moldovan authorized landfills is twice smaller (around 1.5 thousand) and they face substantial problems such as overloading and sanitation. However, it is especially a waste disposal storage where the attention should be brought to because of the landfilled waste high share. According to [12] less than 2% is recycled and the remaining 98% of all solid waste produced in the Republic of Moldova ends in a storage places even though it contains valuable components such as plastics, glass, paper or metal. From the fractional analysis of solid waste produced in Moldovan households, there can be seen an approximate representation of each component. Organic waste forms the largest part (55%) of mentioned analysis, followed by plastics (10%), paper (7%), textile (5%) and others [6,8,13].

There exist several dissimilarities in comparison of waste management in Moldovan rural and urban areas. An inconsiderable difference occurs in amount of daily generated waste per capita which is approximately three times higher in urban areas than in rural areas. However, the same rate observed in the capital city Chisinau is even four times higher than the average amount of Moldovan rural areas; concretely 1.3 kilograms per person per day [8]. Besides, from 60 to 90% of the urban population has access to the waste collection system whereas only minimum percent of Moldovan rural population is covered by any waste collection, thus most people from rural areas are personally responsible for their waste disposal [12]. Such marginal contrast between Moldovan rural and urban areas conditions, all previously mentioned issues and the fact that there is a lack of scientific articles about the waste management situation in Moldova (the only available literature describing the situation are mainly the reports of the German Corporation for International Cooperation, i.e. GIZ projects and the Ministry of Environment of the Republic of Moldova) led to initiation of following broader research for analysing the waste management situation.

2 Aims

The main objective of the research was to investigate current situation of waste management in rural area of village Vorniceni and the capital city Chisinau. To achieve so, there were established following specific aims:

a) Analysis of waste sorting out and recycling of waste types in Vorniceni and Chisinau.

b) Determination of waste production dependence on different factors such as age, sex or place of origin.

c) Analysis of satisfaction with waste management in rural area of Vorniceni and the capital city Chisinau.

3 Material and methods

3.1 Data collection

The survey took place in July 2016. For the collection of primary data, different methods were used. The major part of primary data consisted of information from semi-structured questionnaires, then personal interview with local authority in Vorniceni and observations of targeted areas. The triangulation of used methods ensured a wider examination of the issue. For the purpose of rural and urban areas comparison in this research, the survey was conducted in the biggest Moldovan city, the capital city Chisinau, and nearby village Vorniceni in rural area which was selected for its proximity to the capital city, traffic accessibility and its involvement in a project for future waste management development.

Chisinau with its population of 685,900 inhabitants [14] is divided into 5 parts and in each of them a photo documentation of areas for waste collection was done. On the other hand, Vorniceni is a larger village with around 4 thousand inhabitants [15], situated on the west from Chisinau. Besides the photo documentation of local waste disposal area, an interview with village's mayor took part. Unfortunately, any contacted authority in Chisinau administration did not have enough time to give a personal interview.

Before the beginning of the questionnaire survey convenience sampling method was chosen for questionnaire participants' selection so anybody older than 15 years and willing to cooperate could participate. The questionnaire itself was elaborated in English and subsequently translated to Russian and Moldavian language. A questionnaire testing of English version took place in May 2016 in the Czech Republic to adjust the questionnaire form and possible discrepancies. Despite questionnaire language translation, there was also language barrier between research conductor and survey participants and some literature sources unavailability in English as limiting factor of research survey. The interview with current Vorniceni mayor helped to clarify the waste management situation in the village and also future plans of Vorniceni to build waste management system through participation in project funded by the International Bank for Reconstruction and Development establishing waste management public

services and authorized places for waste disposal (altogether 23 villages from 3 Moldovan rayons applied to participate in this project).

3.2 Questionnaire survey

The questionnaire survey part included filled out questionnaires from the total of 98 participants where 55 respondents came from the capital city Chisinau whereas 43 remaining respondents were inhabitants of rural village Vorniceni. Due to the different development of waste management in the rural and urban Moldovan areas, there were small corrections between the questionnaires for those two areas. The questionnaire was semi-structured and it consisted of 21 questions in the case of questionnaire for rural area and 14 questions in the case of questionnaire for urban area. There were incorporated multiple choice questions, dichotomous questions and open-ended questions in both versions. Questions included in the survey questionnaires were focused on the aspects as amount and types of produced waste, waste sorting and ways of waste disposal, waste collection or satisfaction with local waste management; questionnaires designed for rural areas additionally encompassed questions on farms' characteristics and their waste production.

3.3 Data analysis

The collected data set from questionnaire survey was transcribed into the statistical program SPSS where it has been cleaned, coded and categorized for further analysis. The confidence level for data testing was chosen to be 95%. Following methods were used for testing the data set and clarifying the research questions: (1) Descriptive statistics were used to determine frequencies of every analyzed variable to explore the basic distribution of participants' answers before further testing, the research also examined means of particular unsorted waste types to determine a composition of respondent's waste production; (2) Crosstabulation (Chi-Square test), a method used to analyze a relationship between two variables where there is an opportunity to distinguish which variable is independent and which one is dependent [16], detected whether there was a relationship between the participants' age and the amount of waste they produce per day and also the relationship between the participants' origin and their waste sorting customs; (3) Mann-Whitney's test, a nonparametric test analyzing data from two independent samples where the data (one metric and one scale data) are not normally

distributed [17], for the purpose of this paper examined the variable dealing with amount of sorted waste (in percentage) as a scale variable and respondent's gender and as a categorical data.

4 Results and discussion

For the purpose of waste production analysis, the data of waste amount produced per person per day in kilograms were tested to find if there was a relationship between the mentioned variable and people's age, origin and sex. Whereas according to [18] and their study in Poland the waste quantity is influenced by gender and age structure, this research revealed no statistically provable relationship between the amount of waste production and respondent's sex. The same applies to respondent's origin, even though, there exist studies like the one from [19] which claims that people from rural areas produce less waste than people living in a city. However, in case of age, the relationship between waste production and respondent's age was proven as statistically significant in this research and frequencies of respondent's answers according to their affiliation to specific age group were obtained. On the basis of data distribution, the Chi-Square test and Crosstabulation were used to test following hypothesis:

H_0 = *Younger people and seniors produce less waste disposal than people in middle age in the Republic of Moldova.*

The Pearson's Chi-Square test result came out to be valuable, the *p* value was less than 0.05 and the number of cells with value smaller than 5 was not higher than 30% (*p*=0.000; 8.3% of cells have expected count less than 5), and so it proved that the outcomes from Table 1 were statistically significant. The null hypothesis was confirmed meaning that younger people and seniors really do produce less waste disposal than people in middle age in Moldova. Similar results were found in the research of [20] where the majority of waste was produced by people between 35 and 49 years old.

The crosstabulation (Table 1) showed more specifically that people between ages 15 and 30 years and older than 61 years are more likely to produce less than 1 kilogram of waste. On the other hand, people between the age from 31 to 60 years are more likely to produce more than 2 kilograms of waste per day which is higher amount than the average in the Republic of Moldova (generally 1.48 kilograms per capita). According to the [8] the rate ranges between 0.3 and 0.4 kilograms in Moldovan rural areas and around 0.9 kilograms or more in urban areas. For comparison, the average amount

of household waste in the Czech Republic is 0.8 kilograms [10]. Similar amount of waste was also an outcome of research conducted by [21] in the Czech Republic in 2013 where the measurement of daily waste production per person per day reached values up to 0.88 kilograms with Local Fee system of payment for waste and 0.6 kilograms with Fee by Act on Waste system of payment for waste (there are all together three systems of payment for waste collection in the Czech Republic and they mainly differ in the definition of a person taxpayer). Comparable data can be also seen in [13] research from 23 case studies (developing countries) where the average waste generation reached 0.77 kilograms per person per day while European Union average equals to 1.51 kilograms which is much closer to the Moldovan [10]. However, the amount can differ depending on the type of living. Considering only questionnaire survey run in Vorniceni where the amount of waste was calculated together from respondent's household and a small farm, most respondents claimed they produce even between 0 to 5 kilograms of waste daily.

Table 1. Crosstabulation of relationship between an amount of produced waste and respondent's age

		Kg of waste produced per person per day		
		<1	1-2	>2
	15-30	40.8%	44.4%	14.8%
Respondents'	31-45	25.9%	44.4%	29.7%
age	46-60	20.8%	29.2%	50.0%
	>60	80.0%	20.0%	0.0%
Total		39.8%	35.7%	24.5%

The previous test revealed an amount of waste production among Moldovan people by their age. By [13], age is one of three most important factors considering recycling habits. Therefore, the Chi-Square test where the results were categorized by respondent's age was run again; this time on data focusing on waste sorting. The results showed that people above the age of 61 are less likely to sort out the waste than people under 45 years

old (the *p* value of Pearson's Chi-Square test showed up to be equal to 0.019 and there were no cells with count smaller than 5).

Another focus of the research was to discover waste sorting and recycling habits in the rural and urban areas of the Republic of Moldova. The questionnaire survey exposed that 69.1% of respondents coming from Chisinau are used to sort out waste and only 2.3% of respondents from Vorniceni sort out waste. Based on these findings following hypothesis for waste sorting among Moldovan people was made:

H_0 = *People living in a city are used to sort out waste more than people living in Moldovan rural areas.*

After running Chi-Square test in SPSS the existence of a relationship between the dependent *waste sorting* variable on the independent *origin* variable was proved, the *p* value equaled to 0.000 and the number of cells with amount smaller than 5 equaled to 0%. Conducted crosstabulation demonstrated the correctness of the null hypothesis. Even though there are more people who are not used to sort out waste (60.2% of respondents), among people who do so (39.8% of respondents) it is just residents of cities who are more likely to sort out. Nevertheless, not all the people living in a city do sort out even there exist a place for sorted waste collection in their neighborhood (only 39 of 55 survey respondents living in Chisinau marked sorting as an option how do they dispose the waste). In contrary, as it could seem logical that residents of villages use more composting to get rid of their waste, only 2 respondents out of 43 survey participants living in Vorniceni chose composting as a treatment of their waste. Low involvement in recycling is also confirmed by the [10] which says that only 1% of Moldovan waste is recycled (most of the questionnaire respondents indicated that they sort out around 10% of produced waste). Similar variables were observed in Malaysia where the rate of recycled waste is 5% and where [22] conducted a study in which 59.9% of participants stated that they do not recycle at all. For comparison, countries belonging to the European Union recycle around 23% of waste [10], United States 34.5%, China 3% [23] or Norway even 53% [24]. Even the research which was run by [21] among villages' residents in the Czech Republic showed results of 32.2% of sorted waste. However, there should be mentioned that most of Moldovan villages have less or no opportunities (in form of various bins for sorted waste for example) for their residents to do so. In fact, only

2.3% of Moldovan rural areas have a waste collection cover [12]. For instance, Poland has waste collection coverage on 80% of its territory [25].

The waste collection system in the capital city and in Vorniceni differs a lot. As it was noticed during personal observation of the village, Vorniceni lacks not only bins for sorted waste but there does not exist any waste collection system. In contrary, Chisinau is covered by services of a municipal enterprise, there are bins for both unsorted and sorted waste placed all around the city (just their amount and type is different). All survey participants living in the city marked that they have more than 2 bins for unsorted waste in their neighborhood and there mostly located 2 bins for sorted waste (in accordance to 76.4% respondents) or then 1 bin or zero. The most common and frequent type of bins are for plastics, then glass and paper what the survey participants confirmed in the questionnaires. The majority of aware respondents (41.8%) reported that the bins for unsorted waste are being emptied more than 2 times per week while in case of the bins for sorted waste the majority (20%) stated they are being emptied once per week. On the other hand, village residents are responsible for their waste disposal as it was confirmed by Vorniceni mayor and questionnaire survey. In total, 33.7% of questionnaire respondents marked option *personal treatment* as a way of waste collection in their locality, 30.6% of respondents stated that municipal enterprise Autosalubritate is in charge (this option was chosen only by city residents, inhabitants of Vorniceni have no such opportunity), the rest of participants chose the option *do not know*. Regarding waste collection system awareness, considering only respondents living in city who are covered by waste collection system, the survey results showed that 30 out of 55 participants are aware of the waste collection company and its name, other 25 respondents stated that they do not know about the company or they do but they can not recall its name. Lack of interest in the topic was revealed also in Czech survey conducted by [21] where one third of respondents was not aware of the system of payment for waste they belong to nor the price they pay. The survey included also question on waste collection affordability where 81.8% people from Chisinau responded that the price is affordable.

Attention was paid to the difference between male and female waste sorting habits, too. In this case the Mann-Whitney's test was chosen to examine means of waste amount which is sorted out (in percent) among two independent samples, males and females.

The *p* value came out to be equal to 0.673, the null hypothesis (*H₀ = Moldovan males and females sort out same amount of waste*) retained. Therefore, altogether there is no statistically significant difference between amount of sorted waste which males and females produce and sort out afterwards in the Republic of Moldova. Even though for comparison, there are researches showing that males are less willing to recycle [26], like for instance, research from [21] from the Czech Republic where females are more interested in sorting and they sort by 6% more than males. Likewise, according to [27] study from Wuhan in China, elderly females from low income families are generally more likely to recycle.

This research revealed the number of people who do not sort waste (even if they can or can not) is quite alarming considering the amount of produced waste and its composition (Table 2). As the questionnaire survey disclosed, the majority of respondents produce mainly kitchen waste and plastics or other types of waste. The waste generated by survey participants is formed by approximately 57% of kitchen waste on average but the maximum percentage of generated kitchen waste reaches values up to 92%. According to [13] the average amount of 55% or greater of organic waste is consistent in developing countries; Moldovan national average representation of organic material in waste composition was 68.5% in 2005 and its predicted amount in 2020 is 55% [6]. With regards to kitchen waste amount produced by the survey participants, composting appears to be as the most efficient way of waste disposal. Despite the fact, still just minimum of waste (amount up to 5%) is being composted by the questionnaire respondents. In accordance with the research results, kitchen waste is then followed by other types of waste with 11.3% (including textile) and plastics that forms on average 9.9% of respondents' waste (sorted by 49.1% of survey participants from the city). This value matches the national average of plastics amount in waste composition which reached 9.7% and its prediction for 2020 will increase only by 0.3% [6]. In comparison, Germany produced only 30% of organic waste but 13% of plastics in 2005 [28]. However, the waste composition differs according to a place, the survey data fits into the values of [6] statistics from 2005 and the author's estimation for 2020. The only overlapping waste types are glass and metals by 2 to 3%. An interesting fact about the prediction for 2020 is also the increase of paper production to double and decreasing value of kitchen waste what is possible considering the survey data from

2016.

Table 2.   Descriptive statistics of waste types' production in Moldova (comparison of the research and reference data in percent)

	Minimum	Maximum	Mean	Moldova 2005*	Moldova 2020**
Plastics	1%	35%	9%	9.7%	10%
Paper	1%	30%	7%	5.1%	11%
Glass	1%	20%	7%	4.1%	5%
Metals	1%	20%	7%	3.1%	4%
Kitchen Waste	5%	92%	57%	68.5%	55%
Electronic Waste	1%	20%	8%	-	-
Others	2%	45%	11%	9.5%	15%

*Moldovan national average in 2005 [6]

**Moldovan national average prediction for 2020 [6]

Waste treatment aspect was included into this survey as well and it showed that in average 82.94% of respondents' waste is disposed to mixed waste bins, 8.92% of waste is composted (only by people living in the village), 11.68% is burned and approximately 10% end in open dumpsites. Among the options of waste burning and dumping, majority of respondents who chose such treatments came from the rural area. However, the amount of dumped waste should be much higher considering the fact that all the waste produced in Vorniceni ends in an open dumpsite right next to the village, so if the waste is not composted or burned it is for 100% thrown away to the dumps. Comparing the waste disposal methods in the other countries, the EU member states landfill 19% of the produced waste, United States 42%, Japan 9% or Switzerland only 3% [24].

Another testing question dedicated to satisfaction with waste management in rural areas versus cities showed differences in a respondent's satisfaction. 60.4% of survey respondents were not satisfied or they were more unsatisfied than satisfied with waste management in their locality. Therefore, following hypothesis was established:

H_0 = *People from villages are more unsatisfied with waste management in their locality than people living in cities.*

The Chi-Square test confirmed the reliability of the crosstabulation results (p=0.000 and there were less than 25 % of values smaller than 5). From 48% of unsatisfied respondents, the majority came from village residents which proved that people living in villages are more likely to be unsatisfied with waste management in their locality than people living in cities (there is no any satisfied respondent in Vorniceni). Concretely 74.4% of villagers marked option *unsatisfied*. The same trend can be seen in the option when people are more unsatisfied than satisfied. The rest of people living in Vorniceni (25.6%) marked option *more unsatisfied than satisfied* in the questionnaire. While in the case of city inhabitants, the numbers are more distributed among the answers. Total share of satisfied or more satisfied than unsatisfied respondents reached 29.6%, all of them are coming from the city. If we consider only the city residents, 43.6% marked option *satisfied*, 9.1% option *more satisfied than unsatisfied*, 27.3% option *unsatisfied* and 20% option *more unsatisfied than satisfied*. Nevertheless, there exists a waste management system in the capital city, the distribution of respondents living in Chisinau proved that there are still things to improve. This fact could be changed also by increasing public awareness of waste management among Moldovan population. As according to [29] information takes a decisive part in an influence of people's attitude to the waste management.

5 Conclusions

In conclusion, the situation of waste management in the Republic of Moldova depends a lot on the examined area and challenges or issues that affect this area; as it was also confirmed by the questionnaire survey conducted in the capital city Chisinau and nearby village Vorniceni. Waste management in Moldovan rural areas is unfortunately not so developed like in cities. During the analysis of waste production among Moldovan inhabitants, significant differences in amount of produced waste across age groups were found. People between 31 and 60 are the group which produces the highest amount of waste per day. The major part of this waste is composed of kitchen waste and plastics. Even though there are better conditions for waste sorting and recycling in cities and people living in villages are less likely to sort out their waste, people living in cities do not embrace all options to sort out the waste completely. The results also demonstrated that there is no difference in waste sorting between male and female Moldovan inhabitants. Another analyzed factor was the satisfaction with waste management where the survey revealed higher dissatisfaction among people living in villages which is understandable considering the development of waste management in rural areas. Thus in general, there is an urgent necessity of Moldovan waste system improvement not only from the legal perspective but also by raising awareness and interest in topics dealing with the waste management, waste sorting, waste recycling and its current essential importance among Moldovan citizens.

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List of appendices

Appendix 1: Letter of manuscript acceptance

Authors:
Kateřina Procházková, Tatiana Ivanova, Alexandru Muntean

Decision letter:
April 16, 2018
PJOES-00019-2018-02
Analysis of Waste Management Situation
in the Republic of Moldova – Comparison
of Rural and Urban Areas

Dear Dr. Tatiana Ivanova,

I am pleased to inform you that your manuscript, entitled: Analysis of Waste
Management Situation
in the Republic of Moldova – Comparison
of Rural and Urban Areas, has been finally accepted for publication in our journal.

Thank you for submitting your work to our Journal and fruitful co-operation.

With kind regards,

Professor Hanna Radecka
Executive Editor

Professor Jerzy Radecki
Editor – in – Chief
Polish Journal of Environmental Studies
www.pjoes.com

Appendix 2: A place for waste collection in one of Chisinau districts

Appendix 3: The dumpsite next to village Vorniceni

Appendix 4: Questionnaire for the capital city Chisinau in English

Questionnaire on Waste Management

Dear respondents,

This questionnaire is part of the diploma thesis entitled Analysis of Waste Management in Selected Regions of the Republic of Moldova written at the Faculty of Tropical AgriSciences at Czech University of Life Sciences Prague. It will be used only for the purpose of mentioned diploma thesis. The questionnaire is anonymous. Please circle your answers.

Thank you for your cooperation,

Kateřina Procházková (student)

Name of town:

Number of inhabitants:

I. Sex: a) Male b) Female

II. Age: a) 15 – 30 b) 31 – 45 c) 46 – 60 d) 61 and more

III. Number of family members (leaving in your house/flat): a) 1 – 2 b) 3 – 4 c) 5 and more

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1. How many kilos of solid waste do you produce as a person in your house per day?

   a) less than 1 kg b) 1 – 2 kg c) more than 2 kg

2. What types of waste do you personally produce in your house?
*there is possibility to choose more answers, *please indicate the percentage for each selected option*

   a) Plastic_____ d) Metal_____ g) Other_____

   b) Paper_____ e) Kitchen waste_____

   c) Glass_____ f) Electronic waste_____

3. What types of waste that you produce as a person do you sort?
there is possibility to choose more answers

   a) None d) Glass g) Electronic waste

   b) Plastic e) Metal h) Other_____

   c) Paper f) Kitchen waste

4. How do you deal with the waste that you produce as a person?
*there is possibility to choose more answers, *please indicate the percentage for each selected option*

   a) Compost: _____ d) Bin for unsorted (mixed) waste: _____

   b) Burning: _____ e) Sorting (recycling): _____

   c) Open dumping: _____ f) Other: _____

5. How many bins for unsorted waste that you can use are near your house?

   a) 0   b) 1   c) 2   d) more than 2

6. How often per week are the bins for unsorted waste emptied?

   a) less than 1x   b) 1x   c) 2x   d) more than 2x   e) I do not know

7. How many bins for sorted waste that you can use are near your house?

   a) 0   b) 1   c) 2   d) more than 2

8. For what types of sorted waste are the bins that you can use near your house?
   *there is possibility to choose more answers

   a) Plastic   d) Metal   g) None
   b) Paper   e) Biological waste   h) Other_____
   c) Glass   f) Electronic waste

9. How often per week are the bins for sorted waste emptied?

   b) less than 1x   b) 1x   c) 2x   d) more than 2x   e) I do not know

10. Who is in charge of waste collection/waste disposal in your neighborhood?
    *there is possibility to choose more answers

    a) Municipal enterprise: _____ (please indicate name)

    b) Private enterprise: _____ (please indicate name)

    c) Personal (self) treatment

    d) Other: _____

    e) I do not know

11. If there is an enterprise for waste collection, how much does its service cost per month?

    a) _____   b) there is no such enterprise   c) I do not know
                                 in my neighborhood

12. Is the price for waste collection adequate according to your financial options?

    a) Yes   b) No

13. Does the municipal administration solve somehow the situation around waste management in your neighborhood?

    a) Yes   b) No

14. Do you satisfy with waste management in your locality?

    a) Yes   b) No   c) More Yes than No   d) More No than Yes

Appendix 5: Questionnaire for the rural village Vorniceni in English

Questionnaire on **Waste Management**

Dear respondents,

This questionnaire is part of the diploma thesis entitled Analysis of Waste Management in Selected Regions of the Republic of Moldova written at the Faculty of Tropical AgriSciences at Czech University of Life Sciences Prague. It will be used only for the purpose of mentioned diploma thesis. The questionnaire is anonymous. Please circle your answers.

Thank you for your cooperation,

Kateřina Procházková (student)

Name of village:

Number of inhabitants:

I. Sex: a) Male   b) Female

II. Age: a) 15 – 30   b) 31 – 45   c) 46 – 60   d) 61 and more

III. Number of family members (leaving in your house):   a) 1 – 2   b) 3 – 4   c) 5 and more

1. What is the size of your house farm?

   a) 0 – 4 are   b) 5 – 8 are   c) 9 – 12 are   d) more than 12 are

2. Which type of production is your farm oriented to?

   a) Crop production   b) Animal production   c) Mixed (crops and animals)

3. How many kilos of waste does your house farm produce per day?

   a) 0 – 5 kg   b) 6 – 10 kg   c) more than 10 kg

4. What percentage of the waste that your farm produce is organic?

   a) 0 – 33 %   b) 34 – 66 %   c) 67 – 100 %

5. What percentage of the organic waste do you reuse on your farm?

   a) 0 – 33 %   b) 34 – 66 %   c) 67 – 100 %

6. How do you deal with the waste that you produce on your farm?
   *there is possibility to choose more answers, *please indicate the percentage for each selected option

   a) Compost: _____   d) Landfilling: _____
   b) Burning: _____   e) Organic fertilizer: _____
   c) Open dumping: _____   f) Other: _____

7. How many kilos of solid waste do you produce as a person in your house per day?

    a) less than 1 kg   b) 1 – 2 kg   c) more than 2 kg

8. What types of waste do you personally produce in your house?
*there is possibility to choose more answers, *please indicate the percentage for each selected option*

    a) Plastic_____   d) Metal_____   g) Other_____

    b) Paper_____   e) Kitchen waste_____

    c) Glass_____   f) Electronic waste_____

9. What types of waste that you produce as a person do you sort?
there is possibility to choose more answers

    a) None   d) Glass   g) Electronic waste

    b) Plastic   e) Metal   h) Other_____

    c) Paper   f) Kitchen waste

10. How do you deal with the waste that you produce as a person?
*there is possibility to choose more answers, *please indicate the percentage for each selected option*

    a) Compost: _____   d) Bin for unsorted (mixed) waste: _____

    b) Burning: _____   e) Sorting (recycling): _____

    c) Open dumping: _____   f) Other: _____

11. How many bins for unsorted waste that you can use are near your house?

    a) 0   b) 1   c) 2   d) more than 2

12. How many bins for sorted waste that you can use are near your house?

    a) 0   b) 1   c) 2   d) more than 2

13. For what types of sorted waste are the bins that you can use near your house?
there is possibility to choose more answers

    a) Plastic   d) Metal   g) None

    b) Paper   e) Biological waste   h) Other_____

    c) Glass   f) Electronic waste

14. How many authorized landfills are in your neighborhood?

    a) _____   b) there is no one   c) I do not know

15. How many kilometers from your household is the nearest authorized landfill?

    a) 0 – 5 km   b) 6 – 10 km   c) 10 and more   d) I do not know

16. Who is in charge of waste collection/waste disposal in your neighborhood?
there is possibility to choose more answers

    a) Municipal enterprise: _____ (please indicate name)

    b) Private enterprise: _____ (please indicate name)

    c) Personal (self) treatment

    d) Other: _____

    e) I do not know

17. If there is an enterprise for waste collection, how often per week are the bins for unsorted waste emptied?

    a) less than 1×   b) 1×   c) 2×   d) more than 2×   e) I do not know

18. If there is an enterprise for waste collection, how much does its service cost per month?

    a) _____   b) there is no such enterprise   c) I do not know
                                     in my neighborhood

19. Is the price for waste collection adequate according to your financial options?

    a) Yes   b) No

20. Does the municipal administration solve somehow the situation around waste management in your neighborhood?

    a) Yes   b) No

21. Do you satisfy with waste management in your locality?

    a) Yes   b) No   c) More Yes than No   d) More No than Yes

Appendix 6: Filled questionnaire from the capital city Chisinau

Chestionar privind gestionarea deşeurilor

Stimaţi respondenţi,

Acest chestionar este o parte a tezei de diplomă intitulată Analiza Gestionării Deşeurilor în Regiuni Selectate a Republicii Moldova, elaborată la Facultatea de Ştiinţe Tropicale în Universitatea Cehă de Ştiinţe ale Vieţii din Praga. Acesta va fi utilizat numai în scopul tezei de diplomă menţionate. Chestionarul este anonim. Vă rugăm să încercuiţi răspunsurile.

Mulţumesc pentru cooperare,

Kateřina Procházková (studentă)

Denumirea localităţii: Chişinău
Numărul locuitorilor: 800000

I. Sex: **a) Bărbat**   b) Femeie

II. Vârsta: a) 15 – 30   b) 31 – 45   **c) 46 – 60**   d) 61 şi mai mulţi

III. Numărul membrilor de familie (care locuiesc în casa/apartamentul d-stră): a) 1 – 2   **b) 3 – 4**   c) 5 şi mai mulţi

1. Cîte kilograme de deşeuri solide produceţi personal în casa pe zi?

   a) Mai puţin de 1 kg   b) 1 – 2 kg   **c) mai mult de 2 kg**

2. Ce fel de deşeuri produceţi personal în casă?
   * este posibil de a selecta mai multe răspunsuri, * vă rog indicaţi procentajul pentru fiecare opţiune

   a) Plastic __12__   d) Metal __5__   g) Alte _____

   b) Hîrtie __8__   e) Deşeuri de bucătărie __65__

   c) Sticlă __5__   f) Deşeuri electronice __5__

3. Ce tip de deşeuri personal produse le sortaţi?
   * este posibil de a selecta mai multe răspunsuri

   a) Nici unul   d) Sticlă   **g) Deşeuri electronice**

   b) Plastic   e) Metal   h) Alte _____

   c) Hîrtie   f) Deşeuri de bucătărie

4. Cum procedaţi cu deşeurile produse personal?
   * este posibil de a selecta mai multe răspunsuri, * vă rog indicaţi procentajul pentru fiecare opţiune

   a) Compost: _____   **d) Coş pentru deşeuri nesortate:** __83__

   b) Incinerare: _____   **e) Sortare (reciclare):** __17__

   c) Gunoişte neautorizată: _____   f) Altele: _____

5. Cîte tomberoane pentru deşeuri nesortate sunt în apropierea locuinţei voatre?

 a) 0 b) 1 c) 2 (d) mai multe de 2

6. Cît de des pe săptămînă sunt tomberoanele, pentru deşeuri nesortate, golite ?

 a) Mai puţin de 1× (b) 1× c) 2× d) mai mult de 2× e) Nu ştiu

7. Cîte tomberoane pentru deşeuri sortate sunt în apropierea locuinţei voastre?

 a) 0 b) 1 (c) 2 d) mai multe de 2

8. Pentru ce tipuri de deşeuri sortate puteţi utiliza tomberoane în apropierea locuinţei voastre
este posibil de a selecta mai multe răspunsuri

 (a) Plastic   d) Metal   g) Nici unul
 b) Hîrtie   e) Deşeuri organice   h) Alte _____
 c) Sticlă   f) Deşeuri electronice

9. Cît de des pe săptămînă sunt tomberoanele, pentru deşeuri sortate, golite ?

 a) Mai puţin de 1× (b) 1× c) 2× d) mai mult de 2× e) Nu ştiu

10. Cine este responsabil de colectarea / evacuarea deşeurilor în zona învecinată?
este posibil de a selecta mai multe răspunsuri

 (a) Întreprindere municipală: AutoSalubritate (vă rog indicaţi denumirea)
 b) Întreprindere privată: _____ (vă rog indicaţi denumirea)
 c) Gestionare personală
 d) Alte: _____
 e) Nu ştiu

11. Dacă există o întreprindere de colectare a deşeurilor, cât costă serviciile sale pentru o lună?

 a) _____ 40 lei   b) nu există astfel de întreprinderi   c) nu ştiu
                              în apropierea mea

12. Este preţul de colectare a deşeurilor adecvat în funcţie de opţiunile financiare?

 (a) Da   b) Nu

13. Este preocupată administraţia locală de soluţionarea problemelor legate de gestionarea deşeurilor în vecinătatea voastră?

 (a) Da   b) Nu

14. Sunteţi satisfăcut(ă) de gestionarea deşeurilor în localitatea dumneavoastră ?

 a) Da   b) Nu   c) Mai mult Da decît Nu   (d) Mai mult Nu decît Da

X

Appendix 7: Filled questionnaire from the rural village Vorniceni

Chestionar privind gestionarea deşeurilor

Stimaţi respondenţi,

Acest chestionar este o parte a tezei de diplomă intitulată Analiza Gestionării Deşeurilor în Regiuni Selectate a Republicii Moldova, elaborată la Facultatea de Ştiinţe Tropicale în Universitatea Cehă de Ştiinţe ale Vieţii din Praga. Acesta va fi utilizat numai în scopul tezei de diplomă menţionate. Chestionarul este anonim. Vă rugăm să încercuiţi răspunsurile.

Mulţumesc pentru cooperare,

Kateřina Procházková (studentă)

Denumirea localităţii: *Vorniceni*

Numărul locuitorilor: *5000*

I. Sex: a) Bărbat **b) Femeie**

II. Vârsta: a) 15 – 30 b) 31 – 45 c) 46 – 60 **d) 61 şi mai mulţi**

III. Numărul membrilor de familie (care locuiesc în casa dumneavoastră): **a) 1 – 2** b) 3 – 4 c) 5 şi mai mulţi

---

1. Care este mărimea gospodăriei voastre?

   a) 0 – 4 ari **b) 5 – 8 ari** c) 9 – 12 ari d) mai mul de 12 ari

2. Ce fel de producţie produceţi în gospodărie?

   a) Producţie vegetală b) Producţie animalieră **c) Mixtă (vegetală şi animalieră)**

3. Cîte kilograme de deşeuri produce gospodăria voastră pe zi?

   a) 0 – 5 kg b) 6 – 10 kg c) mai mult de 10 kg

4. Care procentaj de deşeuri produse de gospodăria voastră sunt organice?

   a) 0 – 33 % **b) 34 – 66 %** c) 67 – 100 %

5. Care procentaj de deşeuri organice reutilizaţi în gospodărie?

   a) 0 – 33 % b) 34 – 66 % c) 67 – 100 %

6. Cum procedaţi cu deşeurile produse în gospodăria voastră?
   *este posibil de a selecta mai multe răspunsuri, *vă rog indicaţi procentajul pentru fiecare opţiune

   a) Compost: _____   d) Depozit de deşeuri: *65%*

   b) Incinerare: *20%*   e) Îngrăşăminte organice: *15%*

   c) Gunoişte neautorizată: _____   f) Alte: _____

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7. Cîte kilograme de deşeuri solide produceţi personal în casa pe zi?

   a) Mai puţin de 1 kg   b) 1 – 2 kg   c) mai mult de 2 kg

8. Ce fel de deşeuri produceţi personal în casă?
   *este posibil de a selecta mai multe răspunsuri, * vă rog indicaţi procentajul pentru fiecare opţiune*

   a) Plastic_____   d) Metal_____   g) Alte_____

   b) Hîrtie____ _1 %_   e) Deşeuri de bucătărie _30%_

   c) Sticlă_____   f) Deşeuri electronice _1%_

9. Ce tip de deşeuri personal produse le sortaţi?
   este posibil de a selecta mai multe răspunsuri

   a) Nici unul   d) Sticlă   g) Deşeuri electronice
   b) Plastic   e) Metal   h) Alte_____
   c) Hîrtie   f) Deşeuri de bucătărie

10. Cum procedaţi cu deşeurile produse personal?
    *este posibil de a selecta mai multe răspunsuri, * vă rog indicaţi procentajul pentru fiecare opţiune*

    a) Compost: _____   d) Coş pentru deşeuri nesortate: _70%_

    b) Incinerare: _20 %_   e) Sortare (reciclare): _____

    c) Gunoişte neautorizată: _____   f) Altele: _10%_

11. Cîte tomberoane pentru deşeuri nesortate sunt în apropierea locuinţei voastre?

    a) 0   b) 1   c) 2   d) mai multe de 2

12. Cîte tomberoane pentru deşeuri sortate sunt în apropierea locuinţei voastre?

    a) 0   b) 1   c) 2   d) mai multe de 2

13. Pentru ce tipuri de deşeuri sortate puteţi utiliza tomberoane în apropierea locuinţei voastre
    este posibil de a selecta mai multe răspunsuri

    a) Plastic   d) Metal   g) Nici unul
    b) Hîrtie   e) Deşeuri organice   h) Alte_____
    c) Sticlă   f) Deşeuri electronice

14. Cîte depozite de gunoi (gunoişte) autorizate sunt amplasate în apropierea voastră?

    a) _____   b) nici unul   c) nu ştiu

15. La cîţi kilometri este amplasat cel mai apropiat de gospodăria voastră, depozit de deşeuri autorizat?

a) 0 – 5 km   b) 6 – 10 km   c) 10 şi mai mult   d) Nu ştiu

16. Cine este responsabil de colectarea / evacuarea deşeurilor în zona învecinată?
este posibil de a selecta mai multe răspunsuri

a) Întreprindere municipală: _____ (vă rog indicaţi denumirea)

b) Întreprindere privată: _____ (vă rog indicaţi denumirea)

c) Gestionare personală

d) Alte: _____

e) Nu ştiu

17. Dacă există o întreprindere de colectare a deşeurilor, cât de des pe săptămână sunt tomberoanele pentru deseuri nesortat, golite?

a) Mai puţin de 1×   b) 1×   c) 2×   d) mai mult de 2×   e) Nu ştiu

18. Dacă există o întreprindere de colectare a deşeurilor, cât costă serviciile sale pentru o lună?

a) _____   b) nu există astfel de întreprinderi în apropierea mea   c) nu ştiu

19. Este preţul de colectare a deşeurilor adecvat în funcţie de opţiunile financiare?

a) Da   b) Nu

20. Este preocupată administraţia locală de soluţionarea problemelor legate de gestionarea deşeurilor în vecinătatea voastră?

a) Da   b) Nu

21. Sunteţi satisfăcut(ă) de gestionarea deşeurilor în localitatea dumneavoastră ?

a) Da   b) Nu   c) Mai mult Da decît Nu   d) Mai mult Nu decît Da

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