RESEARCH REPORT ON THE PERCEPTION OF CITIZENS AND REPRESENTATIVES OF LOCAL GOVERNMENT AND PUBLIC INSTITUTIONS ON ISSUES RELATED TO AIR POLLUTION IN KAVADARCI, STRUMICA, GOSTIVAR, KUMANOVO AND STRUGA

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This research is prepared by TIM Institut, in collaboration with Ivana Ivanovic, PhD, Viktorija Borovska, PhD, and Pavlina Zdraveva within the project “Scaling-up actions to tackle air pollution” implemented by the United Nations Development Programme (UNDP) in North Macedonia in partnership with the Ministry of Environment and Physical Planning and Municipalities of Kavadarci, Kumanovo, Gostivar, Struga and Strumica.

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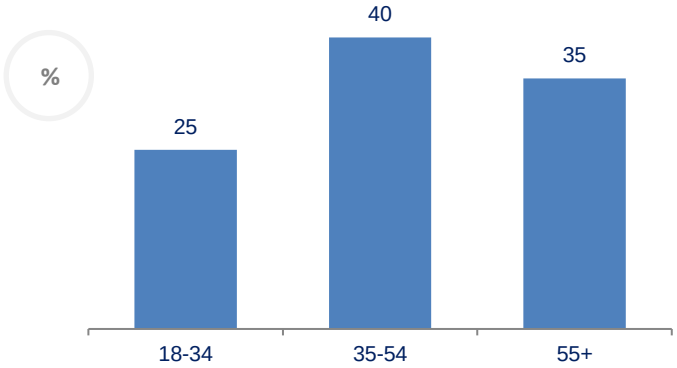
DEMOGRAPHIC STRUCTURE OF CITIZENS, RESPONDENTS FROM ALL 5 MUNICIPALITIES

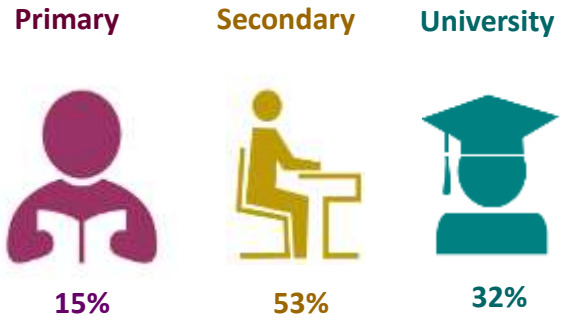
SEX

Women 51% | Men 49%

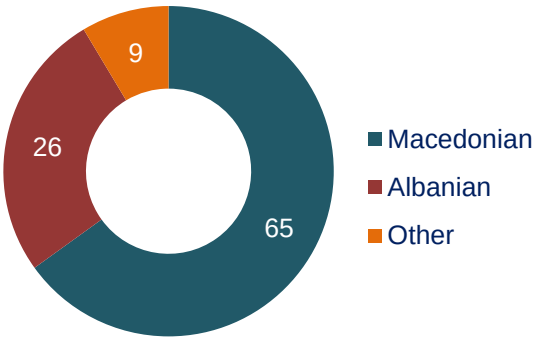
AGE



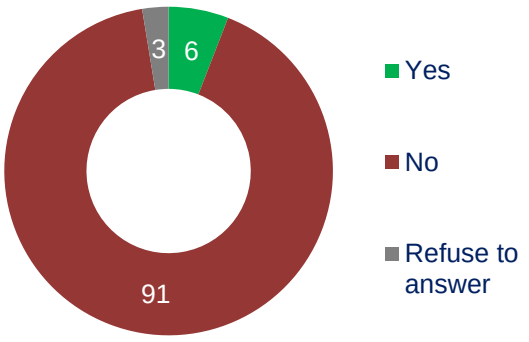
EDUCATION



NATIONALITY

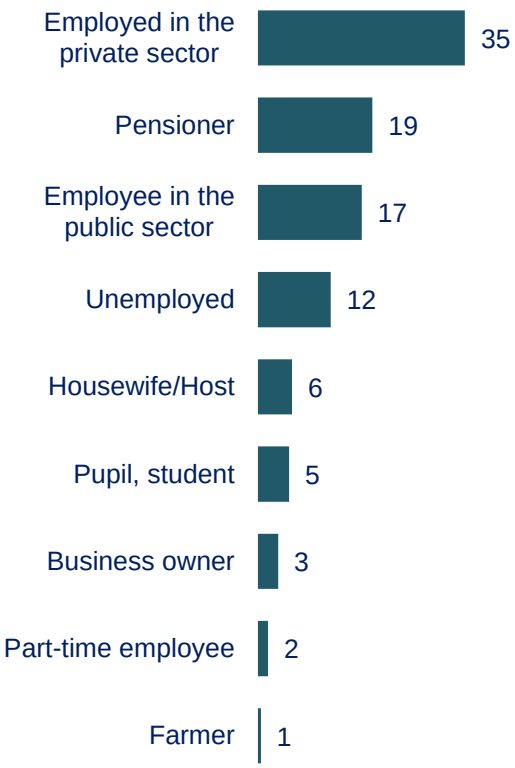


USERS OF SUBSIDIZED ELECTRICITY

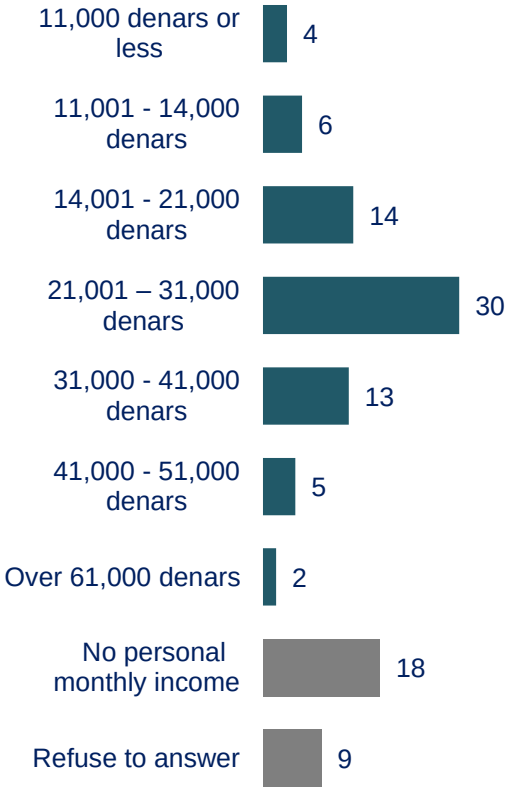


MARITAL STATUS

EMPLOYMENT STATUS



MONTHLY FAMILY INCOME



CONTENT

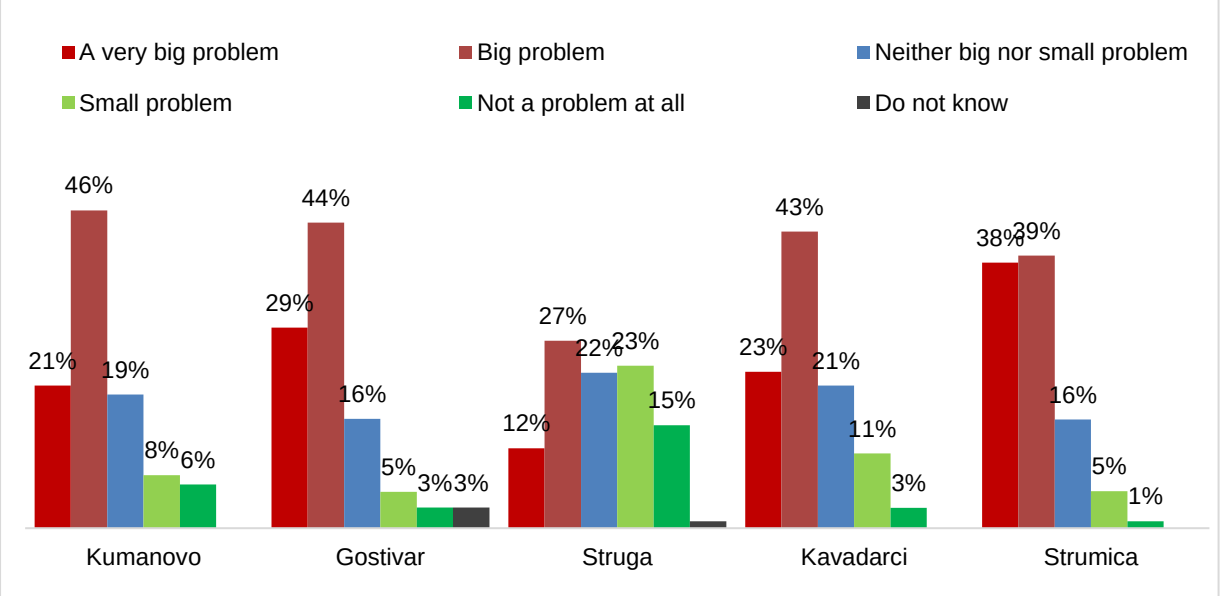
AIR POLLUTION

The first set of questions refers to information related to the air pollution in the city and the implications of polluted air on people's health.

The analysis of the received answers shows that in all five cities where the research was conducted the respondents more often underline that air pollution in their city is a problem. Almost 8 out of 10 citizens of Strumica believe that the air in their city is polluted, while 7 out of 10 citizens of Gostivar share the same opinion. Two-thirds of the citizens of Kavadarci (66%) and Kumanovo (67%) also believe that air pollution in their city is a problem. Interestingly, almost twice less than the citizens of Strumica, the citizens of Struga believe that pollution in their city is a problem (38%).

When it comes to the gender analysis and the perception of men and women from these 5 cities in terms of this question, which is whether they think air pollution in their city is a problem, both men and women state it is a big problem. Generally speaking, there are gender differences at world level in terms of the prevention and health. Women take measures to prevent their health to a greater extent than men (Otterbring, 2022[1]), so the answers to the following questions do not surprise us. We can notice that in terms of awareness of air pollution, there are small differences as to the extent to which it is a problem for the citizens, with women from Kumanovo (71%), Struga (44%) and Gostivar (74%) considering this to be a bigger problem to a greater extent compared to men (61%, 32% and 72%), while in Kavadarci and Strumica there are no significant differences in perception between genders.

Chart 1: (Q1) Generally speaking, do you think that air pollution in your city is:



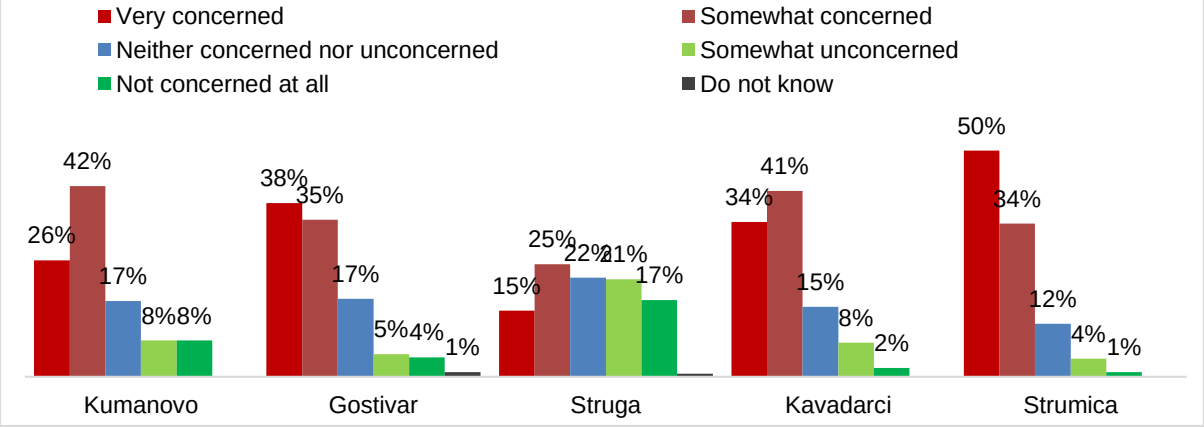
[1] "Pandemic prevention and personality psychology: Gender differences in preventive health behaviors during COVID-19 and the roles of agreeableness and conscientiousness"

According to the answers on air pollution in the city and the concern of the respondents about the consequences on people's health caused by or that could be caused by air pollution, a high percentage is noticed. About 8 out of 10 citizens of Strumica express concern about their health as a consequence of polluted air, while 7 out of 10 citizens of Gostivar, Kavadarci and Kumanovo share the same opinion. The citizens of Struga (40%) are almost twice less concerned about the consequences on one's health caused by or that could be caused by air pollution compared to the citizens of Strumica.

In terms of this question, the gender differences are also not strongly expressed, but there are still small differences. For example, women to a greater extent express concern about the consequences caused by air pollution in Kumanovo (74%), Struga (47%) and Gostivar (74%) compared to men (61%, 31% and 71%), while the situation in Kavadarci and Strumica is even. This finding is consistent with gender differences that generally exist, which relate to the "The Social and Political Economy of Care: Contesting Gender and Class Inequalities" (Razavi & Staab, 2008), where women are the ones who tend to care for the younger or older members of the family, so it can be expected that these practices in terms of caring for the loved ones make women more health-conscious.

The cross-sectional responses of respondents by age groups show that the youngest respondents at the age from 18 to 24 (22%) are the least concerned about the health consequences that air pollution causes or could cause compared to the other age groups at the age from 35 to 44 (17%) and those at the age from 45 to 54 (13%).

Chart 2: (Q2) How concerned are you personally about the health effects that air pollution causes or could cause?

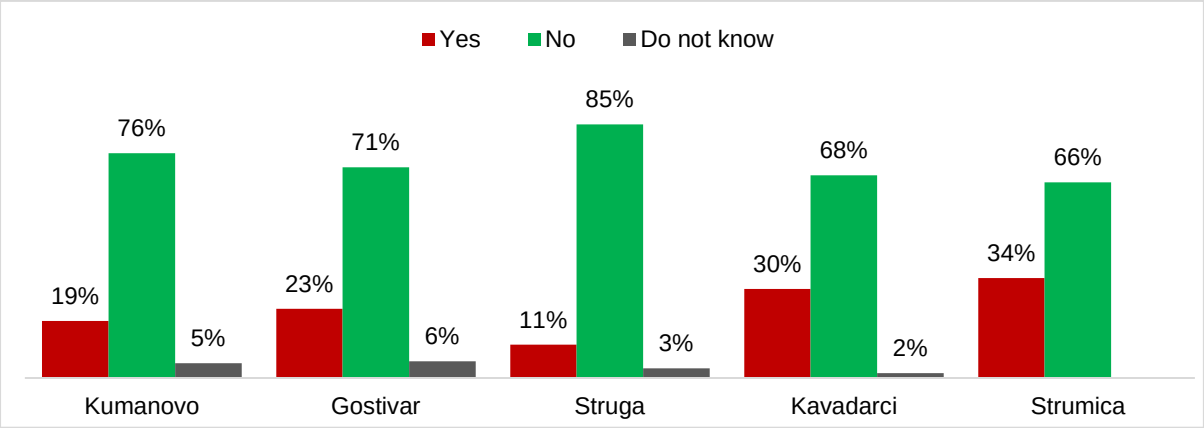


When asked whether they have faced certain health problems due to air pollution, most of the answers are negative, but the respondents from Strumica express 1/3 of positive answers, stating that these citizens have felt a certain health problem as a consequence of air pollution, which is in accordance with the previous answers related to the concern about

one's health. About 1/3 of the positive answers are noticed among the citizens of Kavadarci, while the citizens of Struga provide the lowest percentage of positive answers, which is 11%.

In four of these cities, women have experienced certain health problems more than men due to air pollution, with the exception of Struga where there are no significant differences between genders, but the additional analysis shows that women from smaller ethnic communities, as well as 28% of women without personal monthly income from Struga, gave positive answers to this question to the greatest extent, making them a more vulnerable category in terms of health problems from polluted air than women from the other cities. Furthermore, the older respondents and pensioners (62%) more often provide answers that refer to certain health problems due to air pollution compared to the respondents from the other age groups.

Chart 3 (Q3) Have you felt certain health problems due to air pollution?



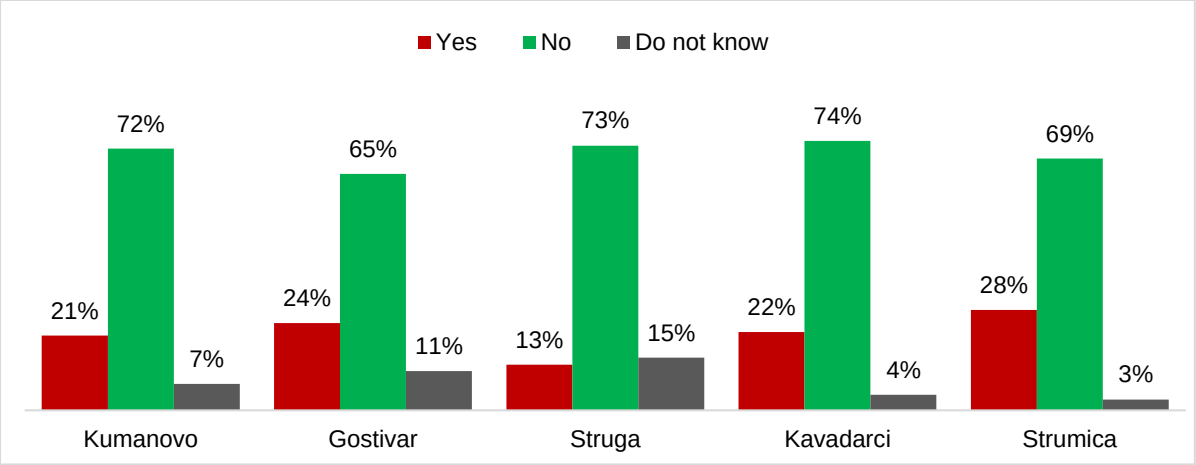
		Sex	
Have you felt certain health problems due to air pollution?		Men	Women
	Yes	19%	28%
	No	78%	69%
	Do not know, refuses to answer	3%	3%
	Total	100%	100%

		Age groups					
Have you felt certain health problems due to air pollution?		18-24	25-34	35-44	45-54	55-64	65+
	Yes	19%	17%	19%	23%	35%	28%
	No	76%	81%	78%	74%	62%	70%
	Do not know, refuses to answer	5%	2%	3%	3%	3%	3%
	Total	100%	100%	100%	100%	100%	100%

The other members of the respondents' households have also felt health problems due to air pollution. These cases are more often noticed among the households in Strumica (28%), while they are the least noticed among the households of Struga (13%).

There are no significant differences in the answers among men and women in terms of this question, except for Kumanovo and Gostivar where women (23% and 30%) are those who notice consequences to the health of the household members from the polluted air more than men (18% in each of the mentioned cities).

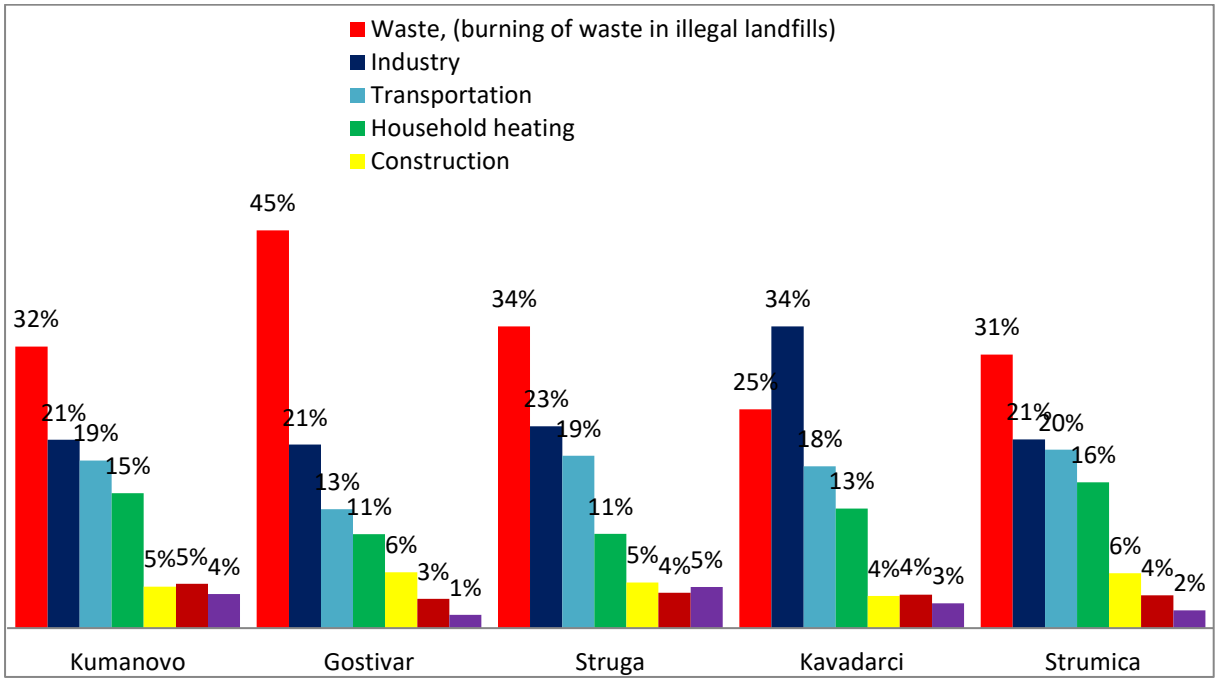
Chart 4. Q4. Has any other family member felt any health problem due to air pollution?



According to the answers of the respondents, it is noted that the waste burning in illegal landfills contributes to air pollution in the cities to the greatest extent. Almost half of the citizens of Gostivar believe that waste burning is the biggest polluter in the city, while almost 1/3 of the citizens of Struga, Kumanovo and Strumica have chosen this source of pollution. Only the citizens of Kavadarci single out industry as the first-ranking source of pollution in the city (34%). In all other cities, industry is the second-ranking source contributing to air pollution. Transport as a source contributing to air pollution in the city was ranked as third by all respondents, followed by waste and industry.

In terms of gender, both men and women have an expressed awareness of air pollutants in their city. The only difference is that among women the awareness of the biggest polluters (waste burning and industry) is expressed to a higher extent.

Chart 5: Q5ab. In your opinion, what do you think contributes the most to air pollution in your city?



The results of this segment of the questionnaire indicate a high awareness of the citizens of all five pilot cities related to poor air quality. More than 70% of the citizens think that this topic is important and spent time to answer the questionnaire. The impact of polluted air on their health and the health of their loved ones is the first and most important consequence they identify and which worries them. Therefore, it is recommended the project to implement actions that will have a clear connection with the improved health aspect of their implementation.

In addition, citizens have a clear idea of the biggest sources of air pollution in their city and identify burning of illegal landfills, industry and transport as the three biggest sources of pollution in their municipalities. Only a third of the respondents believe that the way households are heated is the cause of poor air quality, while a very small part of the respondents (from 3%-12%) believe that construction, agriculture and heating of public institutions belong to the group of "culprits" for the bad air quality, which leads to the conclusion that awareness of their personal and daily activities is not perceived as harmful. It is necessary to compare these answers with the results of the Source Apportionment Studies (when they are ready) and to direct the activities towards changing this perception of the citizens.

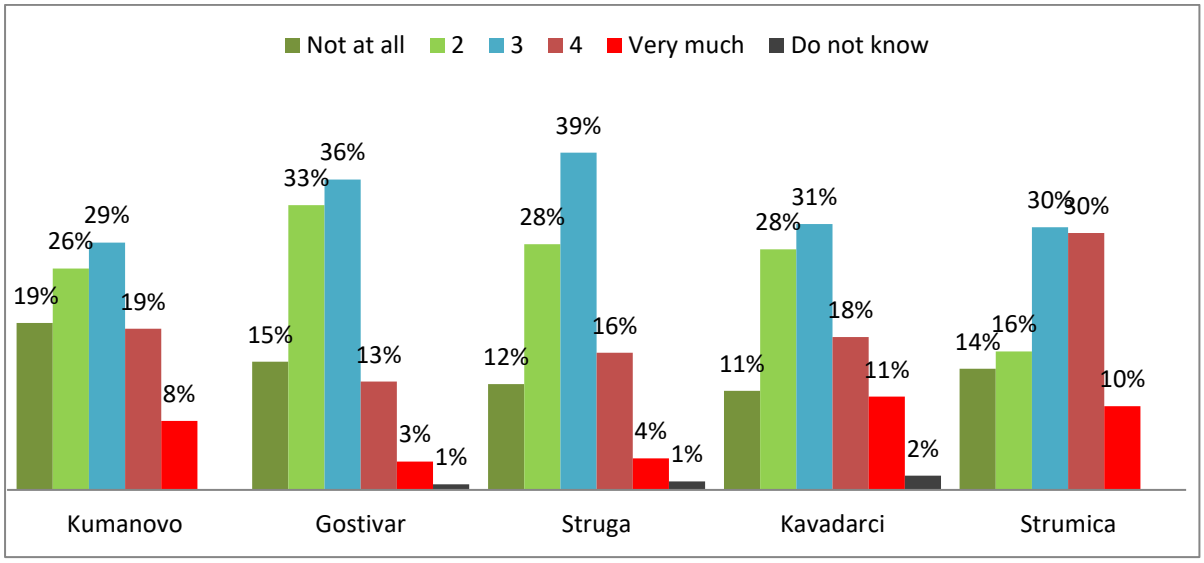
HEATING

The following set of questions refers to household heating, that is, the energy sources respondents use for heating their homes.

When asked to what extent the stated five energy sources that could be used for heating the household affect air pollution in the city, the respondents had different answers. Namely, about half of the respondents of Gostivar and Kumanovo think that firewood does not pollute the air. This percentage is lower among the other respondents and it is 40% among the citizens of Kavadarci and Struga, while one third of the citizens of Strumica agree that firewood does not affect air pollution in the city.

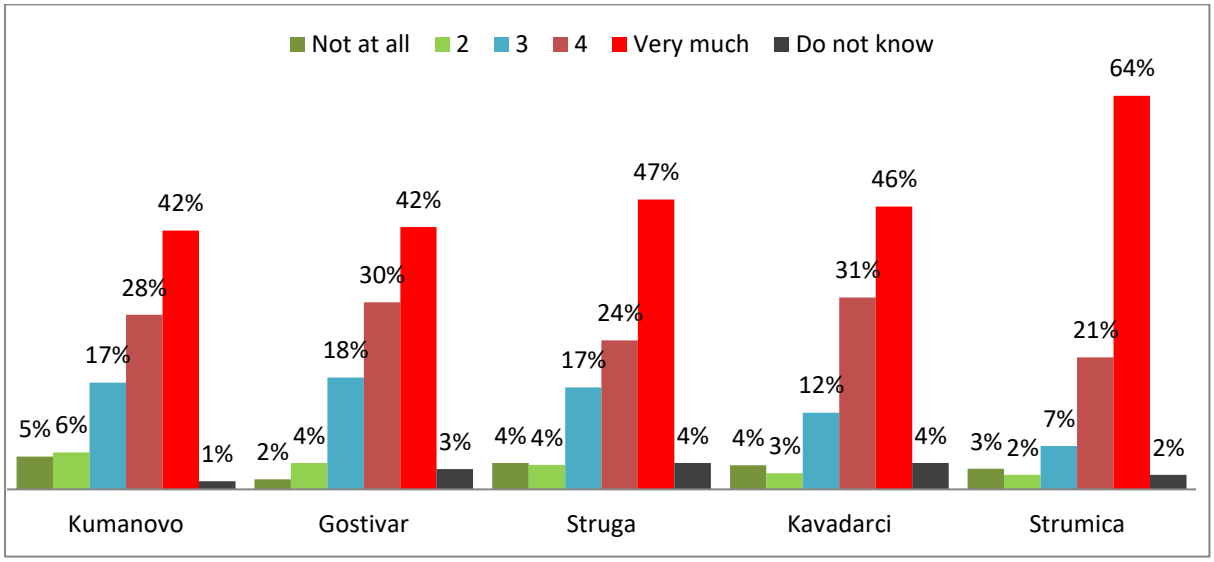
When it comes to gender point of view, there are small differences in the perception about the level of polluting from this energy source. Namely, in Gostivar (19%), Strumica (44%) and Kumanovo (30%) women believe that firewood affects air pollution to a greater extent that men (13%, 35% and 24%). Still, this energy source is a polluter for both men and women. When it comes to the other energy sources, there are no significant gender differences in the answers.

Chart 6. Q6-1. In your opinion, on a scale from 1 to 5 (where 1 is not at all and 5 is very much), to what extent does Firewood affect air pollution in the city?



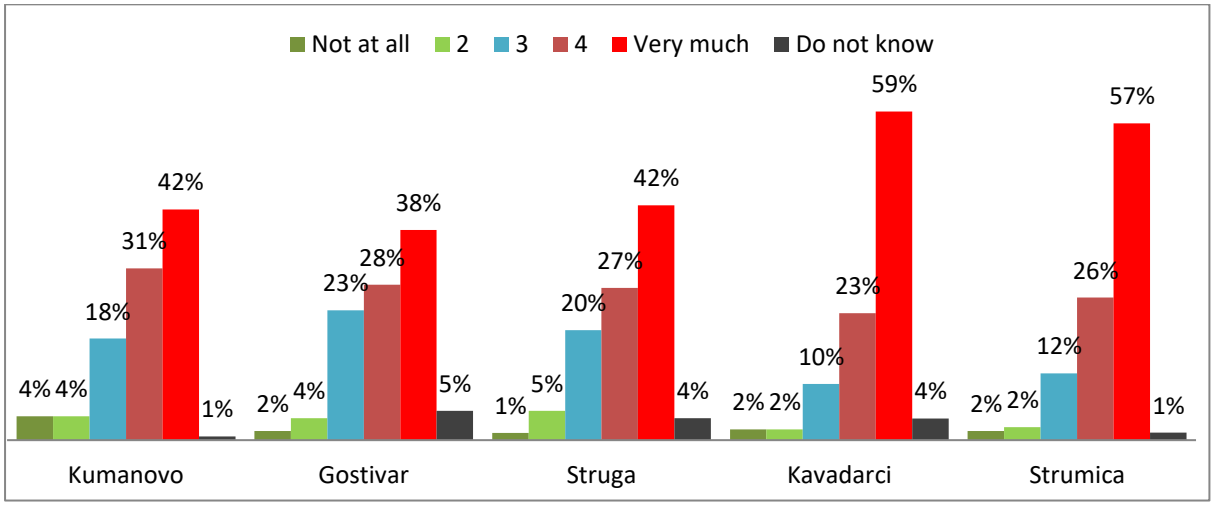
A large number of the respondents agree that coal affects air pollution in the city. Although this energy source is used for household heating, there is still awareness that its influence on air pollution in the city is extremely high.

Chart 7: Q6-2 In your opinion, on a scale from 1 to 5 (where 1 is not at all and 5 is very much), to what extent does Coal affect air pollution in the city?



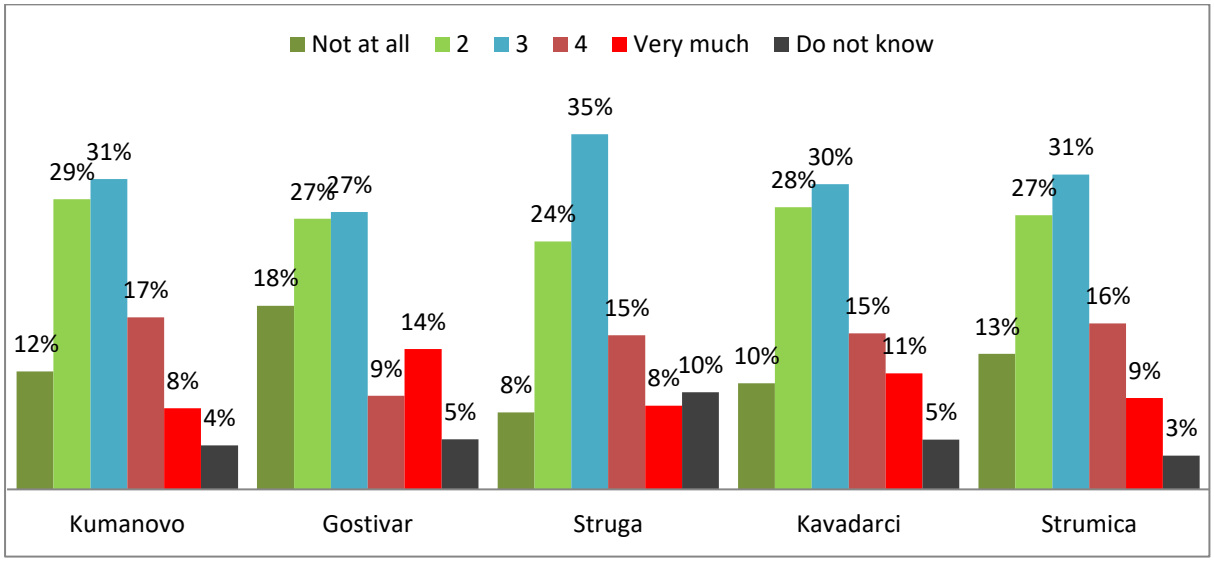
A large number of the respondents agree that heating oil affects air pollution in the city. Despite the fact that this energy source is also used for heating households, there is still awareness that its impact on air pollution in the city is high. The citizens of Strumica express greater awareness that heating oil is a polluter, where 8 out of 10 citizens (83%) rated it with the highest grades that it affected pollution, while this percentage is 66% among the citizens of Gostivar.

Chart 8 Q6-3 In your opinion, on a scale from 1 to 5 (where 1 is not at all and 5 is very much), to what extent does Heating oil affect air pollution in the city?



One fourth of the respondents from all cities agree that pellets affect air pollution in the city. Despite this, most of the respondents still gave high grades on the scale that this energy source used for heating the households did not affect air pollution in the city.

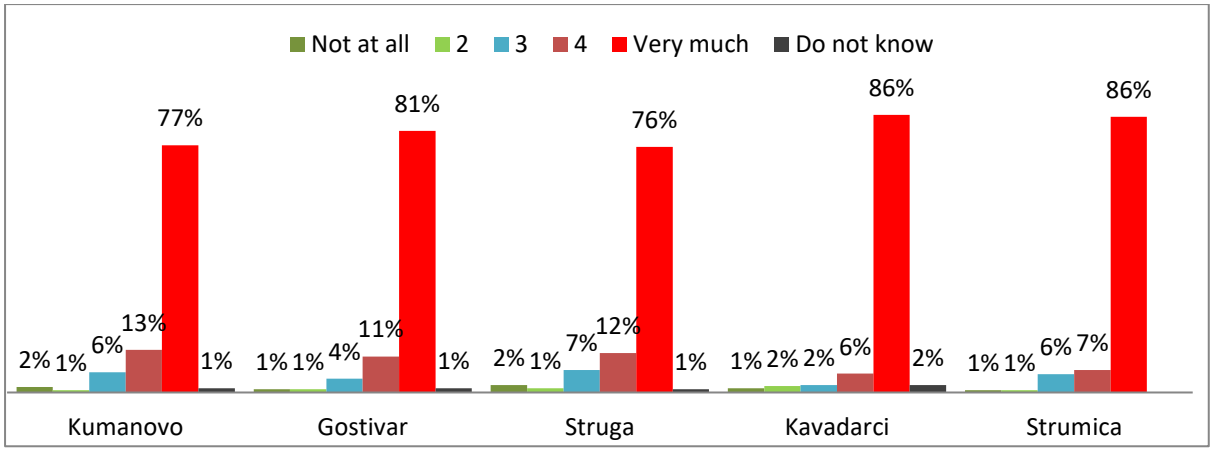
Chart 9: Q6-4 In your opinion, on a scale from 1 to 5 (where 1 is not at all and 5 is very much), to what extent do Pellets affect air pollution in the city?



The respondents mostly agree that different waste materials, such as varnished wood, plastic etc., affect air pollution in the city.

A high percentage of the respondents evaluated this energy source with the highest grades that it affected air pollution in the city.

Chart 10: Q6-5 In your opinion, on a scale from 1 to 5 (where 1 is not at all and 5 is very much), to what extent do Various waste materials affect air pollution in the city?



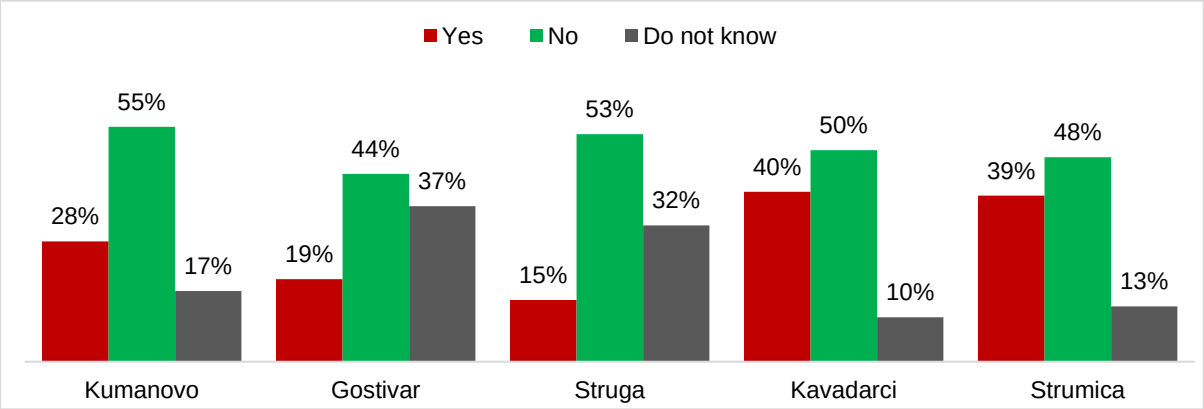
According to the frequency of the received answers, almost half of the respondents from all five cities stated there were no households in their surroundings that used energy sources for heating that were harmful for the environment, such as burning plastic bottles, reused oil, varnished and painted wood, parquet, windows, etc.

However, the citizens of Strumica (39%) and Kavadarci (40%) stated that in their surroundings there were citizens who used waste for heating. This percentage of neighbors

who use waste for heating is 28% among the respondents in Kumanovo, while the respondents in Gostivar and Struga stated that in their surroundings there were significantly fewer households that used inappropriate materials for heating, such as: plastic bottles, reused oil, varnished and painted wood, parquet, windows etc.

There are also "I do not know" answers, especially among men and women from Struga (32%) and Gostivar (37%) who have no information about the use of harmful energy sources for heating in their surrounding area. In terms of this question, there are no significant gender differences in the "I do not know" answer to this question.

Chart 11: Q7. Are there citizens in your surroundings who use waste for heating, for example: plastic bottles, reused oil, varnished wood, parquet and windows etc.?



About half of the citizens of Gostivar, Struga and Kavadarci primarily use firewood for heating their home. In Kumanovo and Strumica, 4 out of 10 households primarily use firewood for heating their home as well.

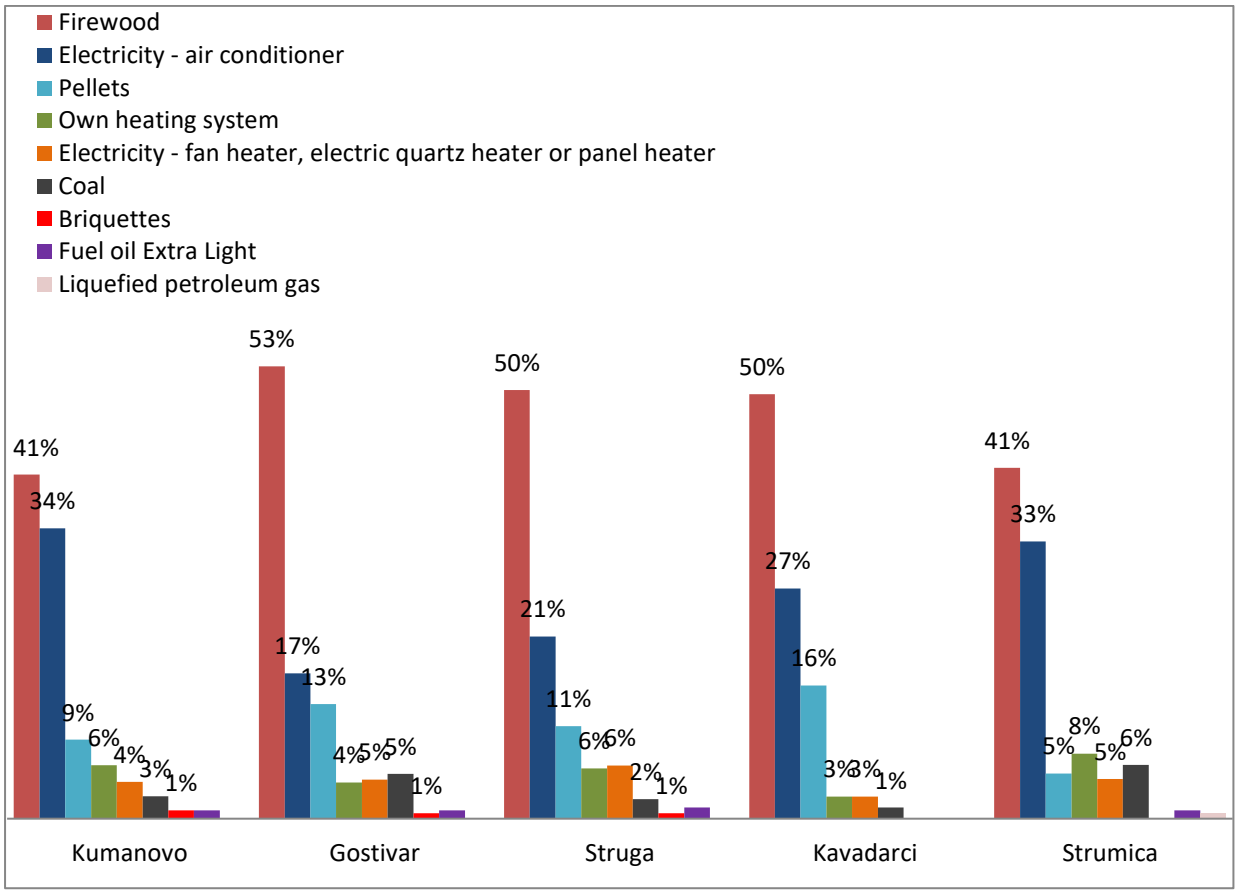
Electricity is the second most commonly used energy source for heating the homes, that is, the use of air conditioners for heating. About 1/3 of the households in Strumica and Kumanovo use air conditioners for heating, while 27% of the households of Kavadarci, 21% of the households of Struga and 17% of the households of Gostivar use air conditioner for heating their home.

The third most commonly used energy source is pellets, expect for Strumica where the individual heating system is on the third place as a way for heating the home.

There are no significant gender differences in terms of this question. Most of the citizens from these cities do not use energy sources that increase the air pollution in the household, such as waste burning or using firewood. Still, the additional analysis showed that one part of the women from Kumanovo (100%) who are without monthly income and one part of the citizens with the lowest income from Struga (4%, social aid users) are those who use this type of heating for their home. The data shows that the poorest citizens are those who are

mostly exposed to polluted air in their home (Haddad, 2021) due to waste burning, especially the women from Roma community from this vulnerable category. Women, just as the further analysis will show, are mostly exposed to polluted air from the way of heating the home since they spend most of their time at home.

Chart 12: Q8 What do you (primarily) use for heating your home?

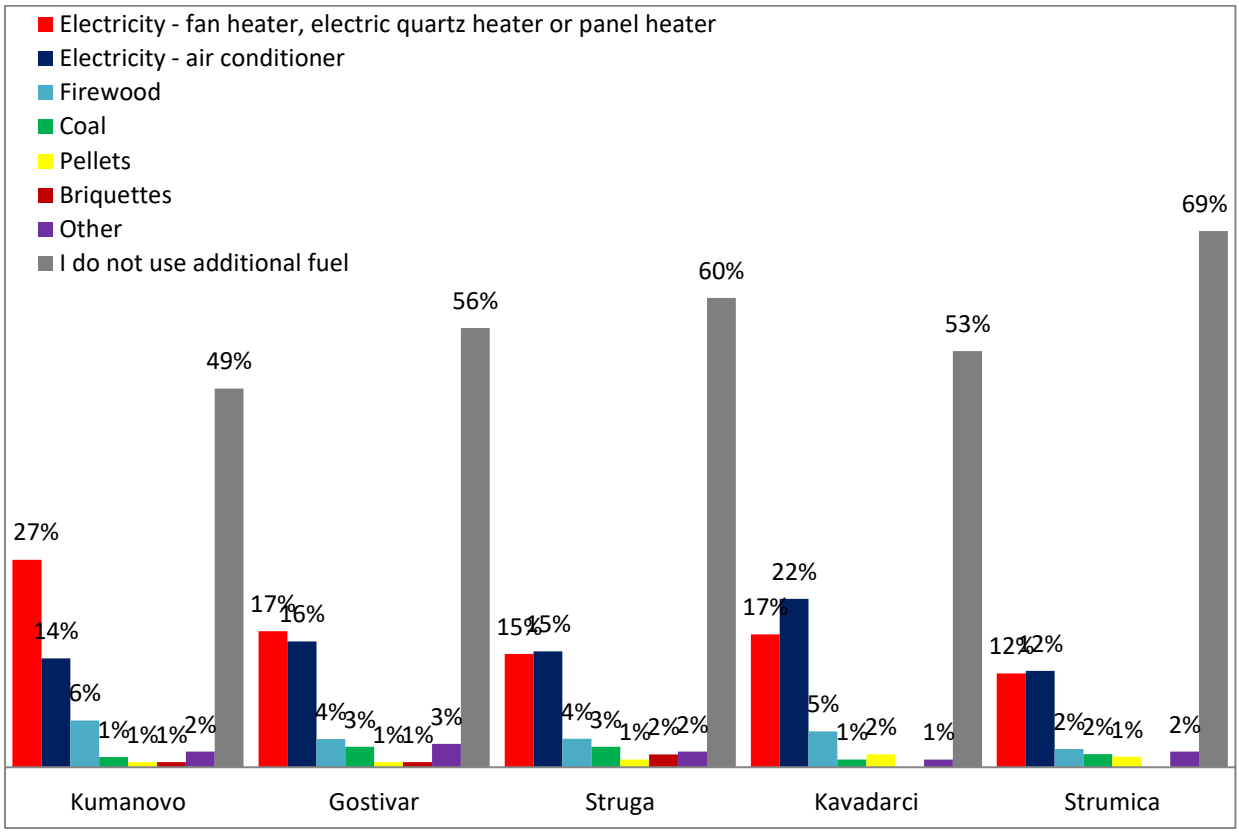


More than half of the interviewed households state they do not use additional fuel for heating (except for the citizens of Kumanovo, 49%). This percentage reaches up to 69% among the citizens of Strumica who do not use additional heating.

Electricity is the most frequently mentioned additional heating method. About 27% of the citizens of Kumanovo use a fan-heater, electric quartz heater or a panel heater for additional heating, while this percentage among the citizens of Gostivar and Kavadarci is 17%.

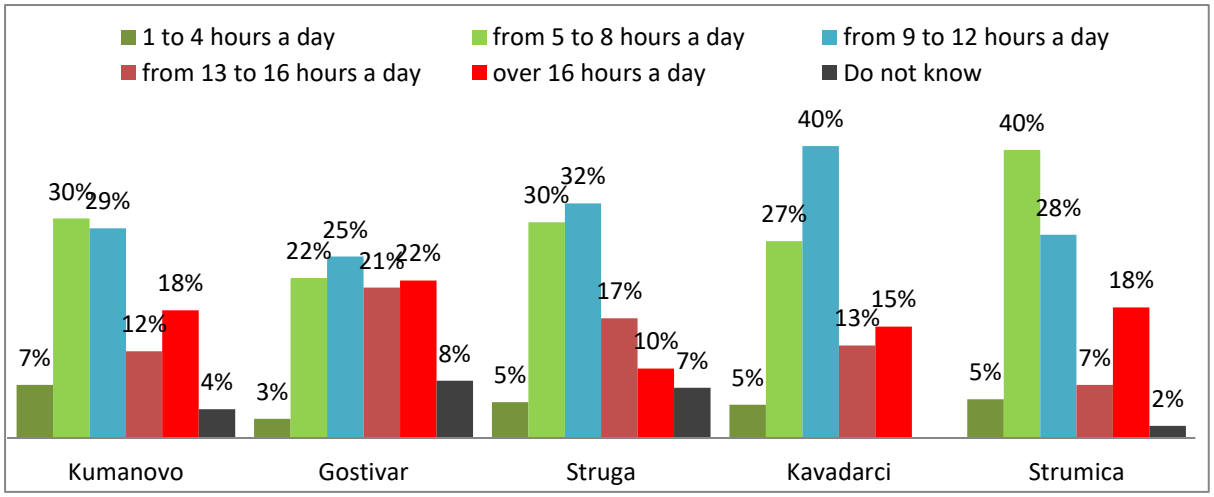
The citizens of Struga (15%) and Strumica (12%) equally use fan heaters, panel heaters and air conditioners.

Chart 13: Q9. What do you (additionally) use for heating your home?



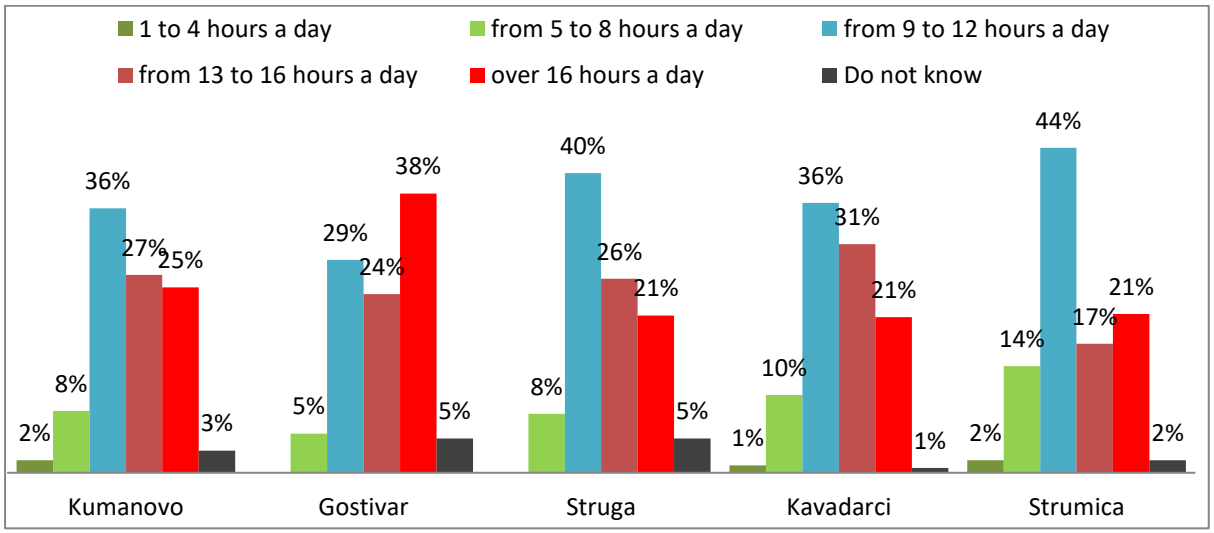
Three out of ten households in Kumanovo, Struga and Kavadarci heat their household up to 8 hours a day during weekdays, while 45% of the households in Strumica heat their home the same number of hours a day. The citizens of Gostivar (22%) heat their home the longest or over 16 hours a day during weekdays.

Chart 14: Q10. How many hours a day do you heat your home during weekdays?



What can be noticed is that the citizens of Gostivar heat their home the longest during the day (38%), or 16 hours a day, during weekends as well.

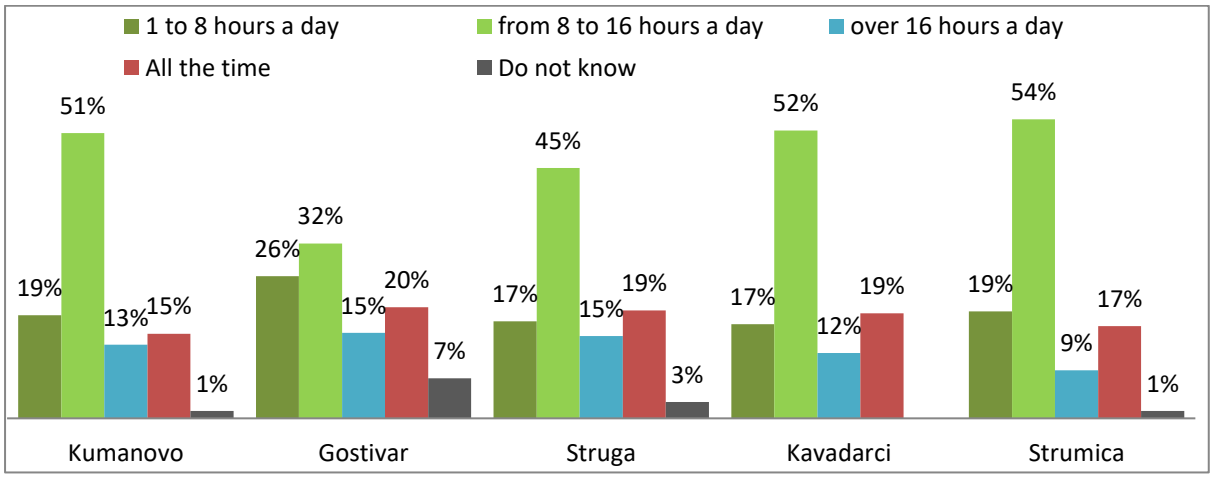
Chart 15: How many hours a day do you heat your home during weekends?



As for the number of hours the respondents spend in their home on weekdays, almost half of the citizens of Kumanovo, Struga, Kavadarci and Strumica stated they spent up to 16 hours a day. Only the respondents from Gostivar state lower number of hours spent at home, expressed by 32% of the respondents. 1/5 of the citizens of Gostivar, Struga and Kavadarci stated they were always at home.

There are significant gender differences in terms of this question. Taking into account the differences in terms of gender equality and traditional values according to which the place of the woman is more at home, that is, with the family, instead of in public and social life, the data from this research goes in that direction. The data show that women (36%) spend significantly longer time at home than men (26%) during weekdays. In terms of exposure to air pollution through home heating, in those homes where air-polluting energy sources are used, these women are slightly more exposed to air pollution than men. Of those who answered that they spent more than 16 hours a day at home, i.e. they spent all the time at home, the most numerous were women from Struga (43%) and Gostivar (40%), followed by Kumanovo (35%). The additional analysis shows that of these women, who spend most or all of their time at home during weekdays, the most numerous are those without personal monthly income, that is, the poorest.

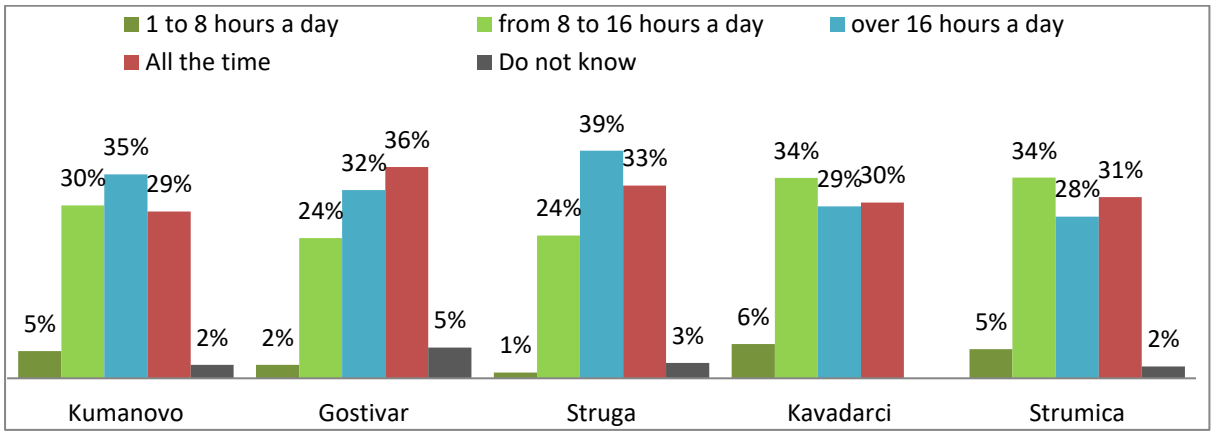
Chart 16: (Q12) How many hours a day do you spend at home on weekdays?



The number of hours the respondents spend at home during weekends is higher. Namely, almost a third of the population of all cities is at home all the time during weekends.

When it comes to this question, that is, when talking about weekends, there are differences between men and women. Namely, 70% of the women spend more time at home compared to men (59%) during weekends as well. This again corresponds with the traditional values where during weekends and holidays women spend most of their time at home, doing their chores, while men are most of the time outside the home. The additional analysis shows that of those women who spend all their time at home during weekends, the most numerous are the women from Gostivar (69%), Struga (83%) and Kavadarci (59%), followed by the women from Kumanovo (65%) and Strumica (17%). What is interesting is that in addition to the fact that women who have no personal monthly income are among the most numerous in this category, there are also women who have solid personal monthly income, which again points to the influence of patriarchal values in terms of leaving domestic responsibilities mostly to women. However, there is still a difference in exposure to the harmful effects of polluted air in the home on women from households with lower incomes due to the use of more polluting energy sources.

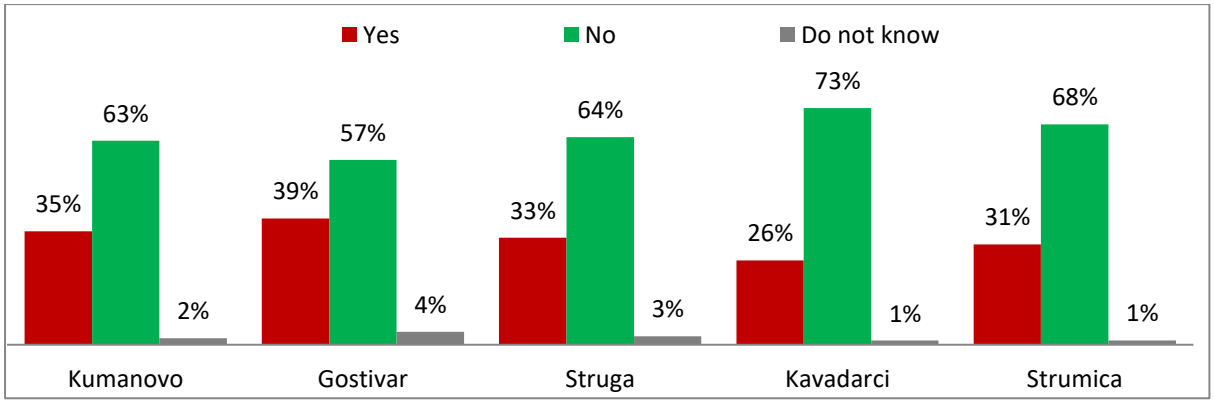
Chart 17: (Q13) How many hours a day do you spend at home during weekends?



A significant part of the respondents thinks that with the way of heating their home, they do NOT contribute to air pollution in the surrounding area where they live. Namely, this percentage of responses that the respondents do not contribute to air pollution with the way of heating their home is mostly expressed by the citizens of Kavadarci (73%), while 2/3 of the citizens of Strumica, Struga and Kumanovo categorically claim that the energy source they use for heating their home does not pollute the surrounding area where they live. This percentage is 57% among the respondents of Gostivar.

There are no significant differences in terms of the answers of men and women, but from those who gave a positive answer that they contributed to polluting the air in the surrounding area where they lived with the way they heated their home, men (34%) appeared in slightly higher number compared to women (32%). This indicates the greater awareness of men about the harmful consequences to the health from the way of heating the home.

Chart 18: Q14. Do you think that the way you heat your home contributes to air pollution in the surrounding area where you live?



From the offered answers, most of the respondents use firewood for heating (from 41% to 53%, depending on the city), followed by air conditioner, that is, electricity (from 17%-41%) and pellets (5% to 6%). The fact that a significant part of the respondents uses firewood,

coal, heating oil or waste for heating (especially a big percentage of the citizens of Strumica (49%) and Kavadarci (52%)) is surprising, even though those respondents are aware of the negative influence on air quality.

The answers in this part of the questionnaire confirm the conclusion from the previous part, which is the low level of awareness about the personal contribution and responsibility about the poor air quality. Although most of the respondents use firewood for heating, they do not perceive burning wood as a reason for the poor air quality, (even about half of the respondents from Gostivar with 48% and from Kumanovo with 45%) although firewood is the most commonly used energy source for heating.

The answers show that men are more aware of the harmful consequences to health from the way they heat their home, although women (36%, i.e. 70%) are the ones who spend most of the day (both on weekdays and weekends) at home, exposed to poor air quality in their home. A deeper analysis of the answers reveals that their personal monthly income is not the reason for the longer presence of women in their home, but the influence of patriarchal values and domestic obligations.

READINESS FOR INVESTING

Relatives, friends, and neighbors are the source of information that respondents trust the most when it comes to recommending an efficient solution for saving energy for changing the way to heat the home. Namely, a quarter of the citizens of Strumica (25%), Kavadarci (30%) and Gostivar (30%), Kumanovo (37%) and Struga (37%) state that if they changed the current way of heating their home, they would mostly trust relatives, friends, and neighbors for a recommendation.

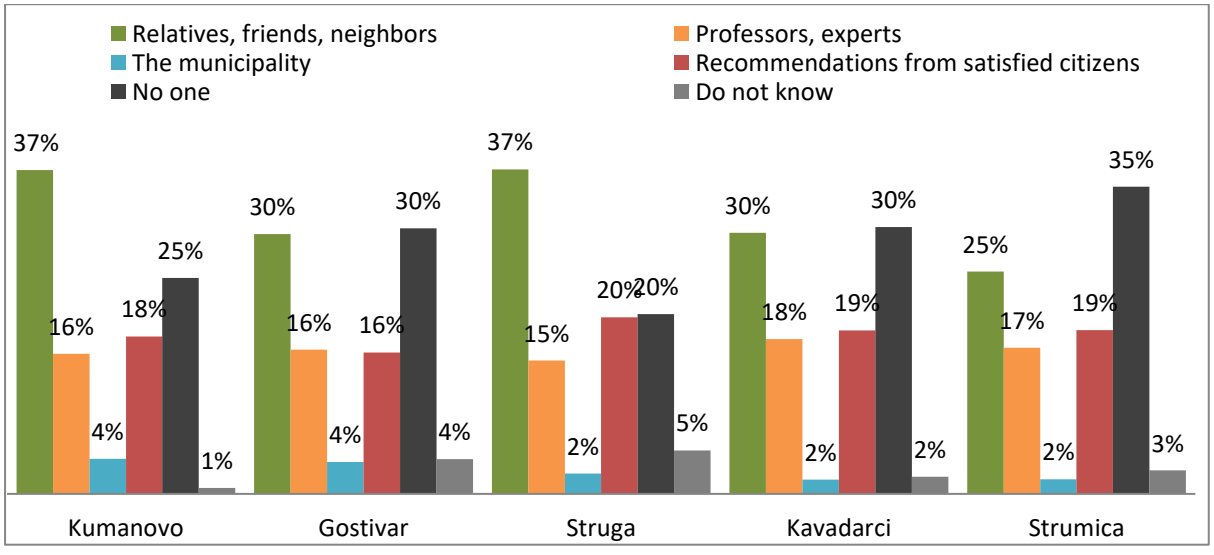
This is followed by recommendations from satisfied citizens, mentioned by about a fifth of the respondents in all 5 targeted cities, and recommendations from professors and experts, cited as the most trusted source on a lower scale (by 15% of respondents from Struga, 16% of respondents from Gostivar and Kumanovo, 17% of respondents from Strumica and 18% of respondents from Kavadarci).

The municipality as a source of information that citizens trust the most for recommending an energy-efficient solution for heating the home is mentioned by the lowest percentage (3%) of respondents.

It is interesting to note that a significant percentage of the interviewed citizens of these five target cities state that if they were to change the current way of heating their home, they would trust no one when it comes to recommendation for an energy-efficient solution for saving energy (20% of respondents in Struga, 25 % in Kumanovo, 30% in Gostivar and Kavadarci and 35% of the respondents in Strumica).

There are no significant differences in terms of the answers between men and women. Only the percentage of men from Gostivar (34%) who do not trust anyone is higher that the percentage of women (27%).

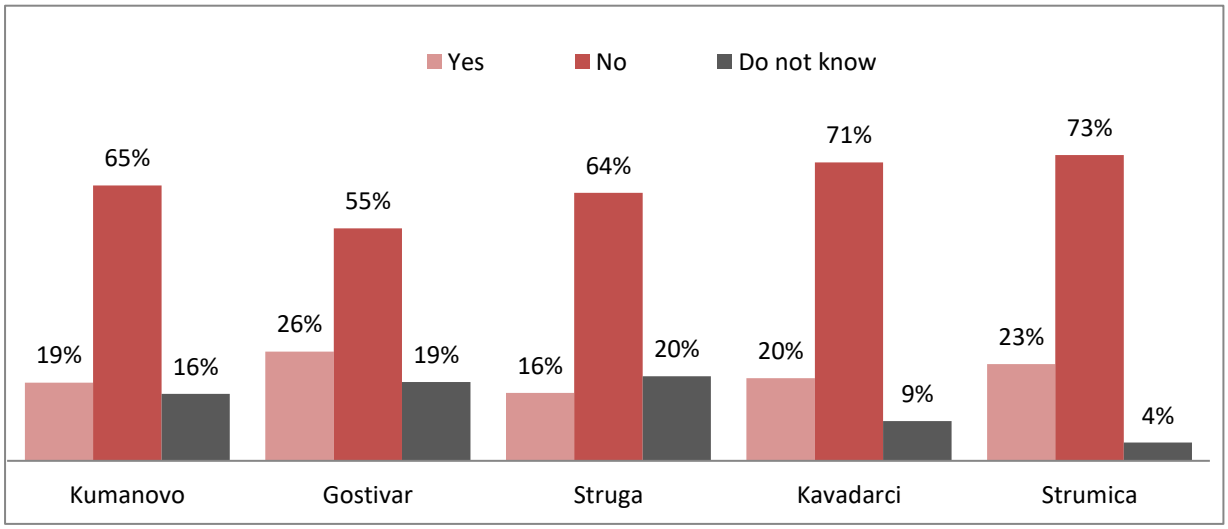
Chart 19: Q15. If you were to change the way you currently heat your home, who would you trust most when it comes to recommendations for an efficient solution for saving energy?



Most of the respondents from all 5 cities are not interested in changing the current way of heating their home. The most interested are the interviewed citizens of Gostivar (26%), Strumica (23%) and Kavadarci (20%), while the respondents from Kumanovo (19%) and Struga (16%) show less interest. However, almost a fifth of the respondents from Kumanovo, Gostivar and Struga state that they do not know if they would change the current way of heating their home.

Regarding the responses of men and women from these 5 cities, no significant differences are observed. The small differences in favor of an affirmative answer that they would like to change the current way of heating the home are consistent with the opinion (of men or women) that the current way of heating the home affects air pollution. Therefore, in Kumanovo (21%) and Struga (19%) men are more ready to change the way of heating their home, while in Gostivar (31%) women are more ready to change the way of heating their home.

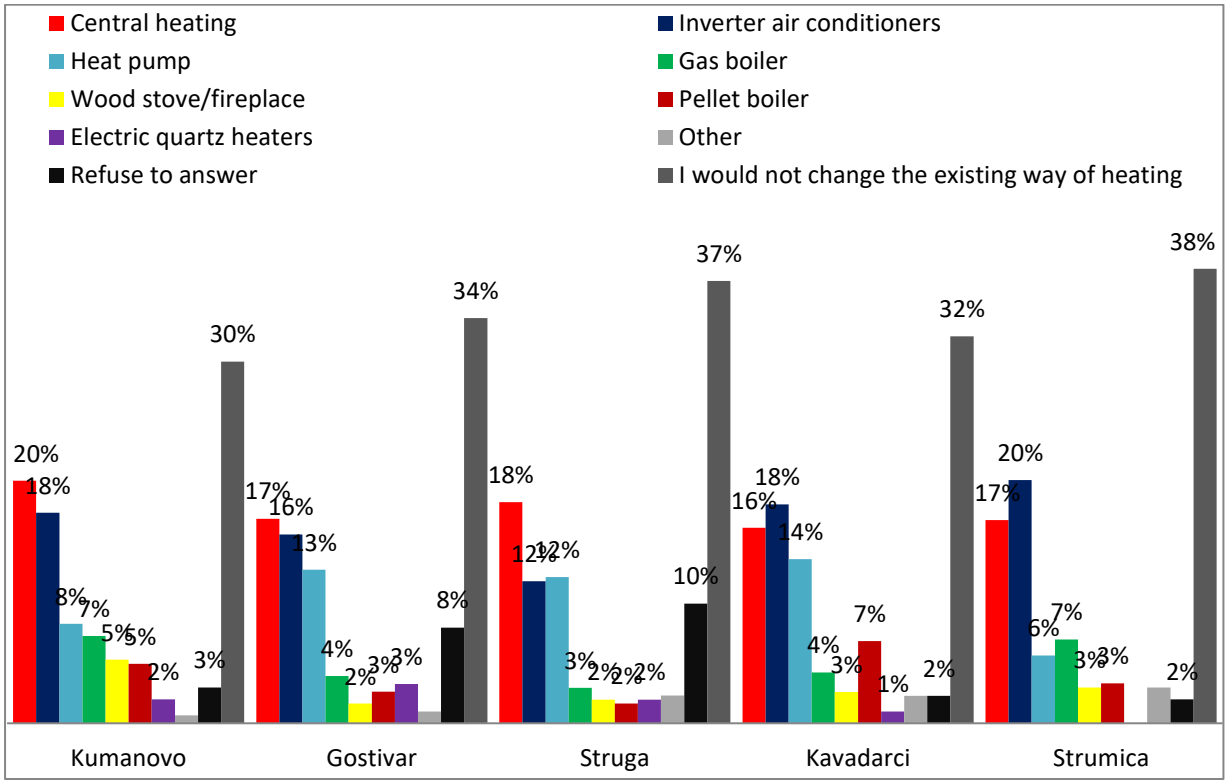
Chart 20: Q16. Do you want to change the current way of heating your home?



In addition to the received results from the previous question, when asked which way of heating they would choose for their home, most of the respondents state they would not change their current way of heating even if they could choose, regardless of the price for equipment installation and monthly cost.

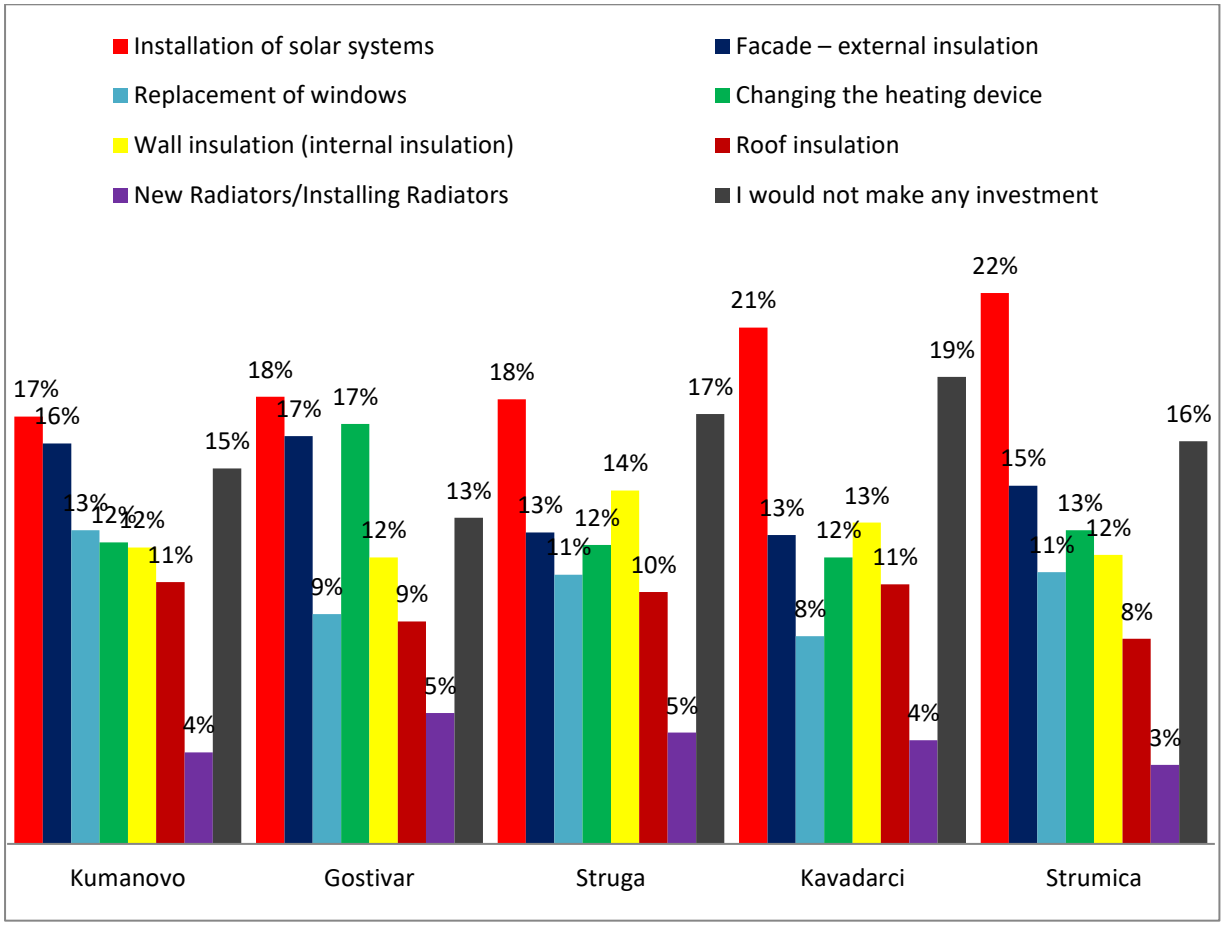
Central heating and inverter air conditioners would be the most common choice of heating if the cost of installing the equipment and the monthly cost were not an issue. Namely, these two ways of heating the home are mentioned by almost a fifth of the respondents, followed by a heat pump. Stoves, pellet boilers and electric quartz heaters would be significantly less often chosen as a heating method, if the cost of equipment installation and monthly costs were not taken into account.

Chart 21: Q17. If you could choose, regardless of the price for installing the equipment and the monthly expense, which heating method would you choose for your home?



If they could make an investment in their home in order to save more energy, the interviewed citizens from all five cities most commonly state they would install solar systems and façade, while the least common answer is new radiators. The citizens of Gostivar would change the heating device more, while the citizens from Struga would make wall insulation more. About 2 out of 10 citizens from all 5 cities would not make any investment in their home for saving more energy. There are no significant gender differences in terms of this question.

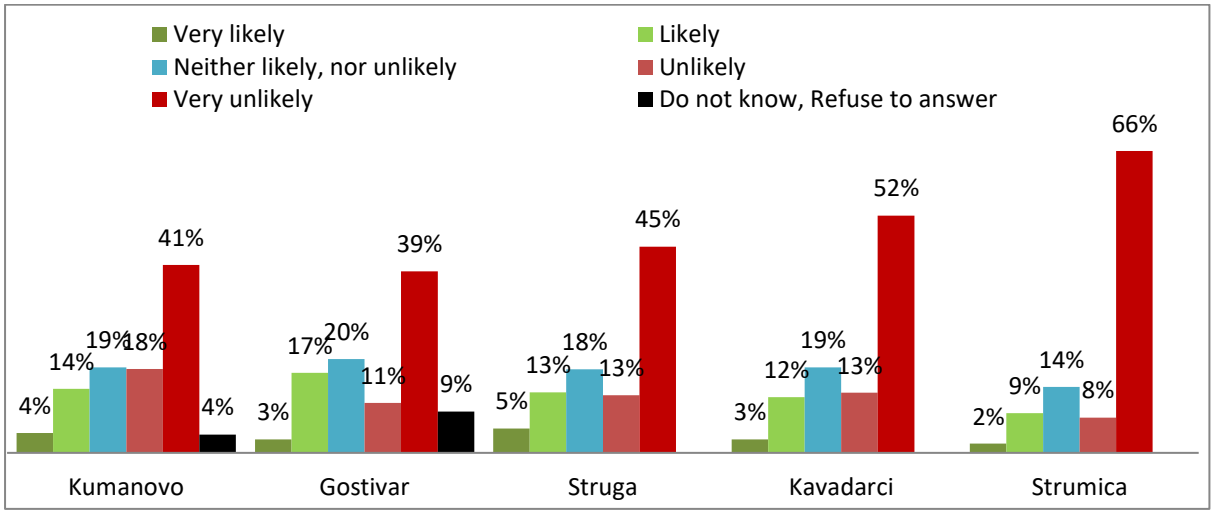
Chart 22: Q18-20. If you could make three investments in your home to save more energy, what would those three investments be in your opinion?



Less than a fifth of the interviewed citizens in all five cities state that it is likely (aggregated answers very likely and likely) to decide to make an investment in the following 12 months (20% of the citizens of Gostivar, 18% of the citizens of Kumanovo and Struga, 15% of the citizens of Kavadarci and 11% of the citizens of Strumica). Most of the interviewed citizens stated that it was very unlikely to decide on an investment in the following 12 months.

The way of answering this question is interesting from a gender perspective because, as it will be seen below and in accordance with patriarchal values, decisions in the home are mostly made by adult male members, or the head of the house (European Institute for Gender Equality, 2016). This means that men and women answer this question differently. Some give an answer as the person who mostly makes that decision in their home, while women answer mostly as the person who guesses what decision will be made by the one who would actually make the decision in their household. The data shows that there are small differences in the responses.

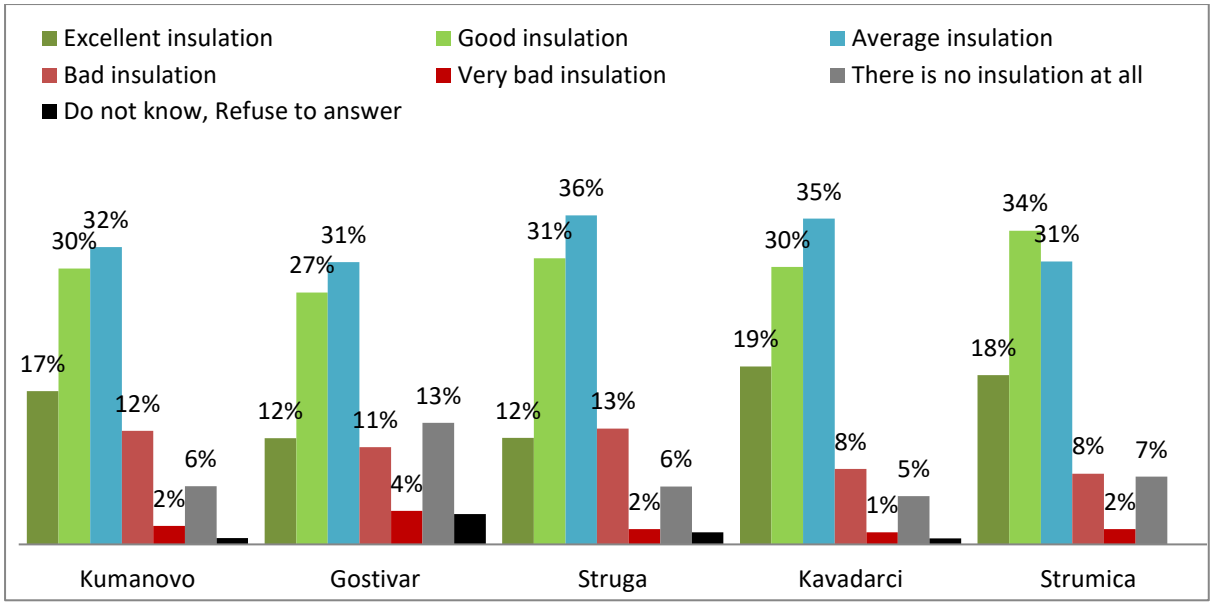
Chart 23: Q21. How likely is it that you would decide to make any of the previously mentioned investments in the following 12 months?



More than a third of the interviewed citizens of all five target cities state that the home they live in has an average insulation. 27% of the citizens of Gostivar, 30% of the citizens of Kumanovo and Kavadarci, 31% of the citizens of Struga and 34% of the citizens of Strumica estimate they have good insulation. Less than a fifth of the citizens of Kavadarci (19%), Kumanovo (17%) and Strumica (18%) state that the home they live in has excellent insulation. This opinion is shared by 12% of the citizens of Gostivar and Struga.

In terms of gender, there is a difference in the perception of men and women regarding the quality of insulation in the home in Gostivar and Struga. Having in mind that women (69% from Gostivar, and 83% from Struga) spend more time at home (during weekdays and weekends), they feel the effects of insulation more. Taking this into consideration, women (19% from Gostivar and 16% from Struga) have objections to the quality of home insulation to a greater extent than men. Men (44% from Gostivar and 43% from Struga), on the other hand, are more satisfied with the existing insulation in their home. No significant differences between genders are observed in the other 3 cities.

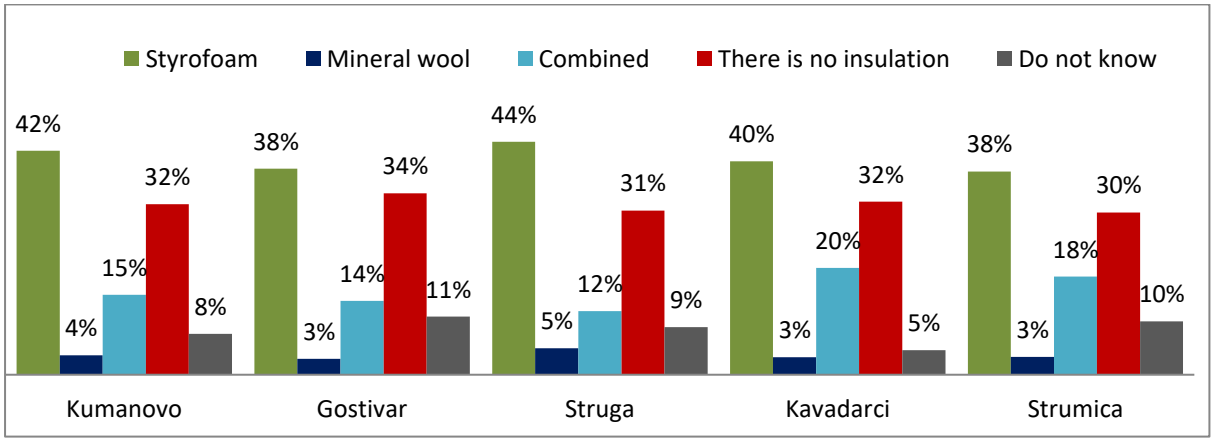
Chart 24: Q22. Would you say the home where you live has:



About 4 out of 10 interviewed citizens from all 5 target cities state Styrofoam as wall insulation in their home. Less than one fifth of the respondents have a combined insulation, while less that 5% have mineral wool for insulation. About a third of the respondents from all five cities stated they had no wall insulation at all. One in 10 respondents does not know whether and what kind of wall insulation he/she has in his/her home.

In terms of gender differences, it can be noticed that there are no significant differences, but it can also be noticed that those who answered “I do not know” about the type of wall insulation in their home are mostly women (12%).

Chart 25: Q23. What type of wall insulation do you have in your home?

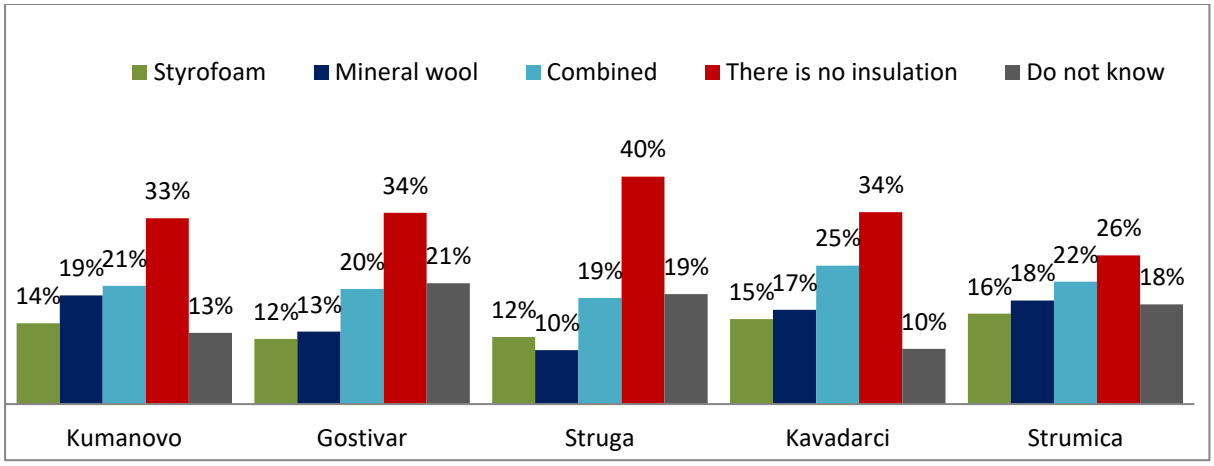


When it comes to the roof insulation, the most frequent answer of the citizens is that their home has no roof insulation at all. One third of the households in Kumanovo, Gostivar and Kavadarci have no insulation, while the respondents from Strumica express even lower percentage of roof insulation, which is 26%, while the households in Struga have the highest percentage of roof insulation, which is 40%.

2 out of 10 interviewed citizens of all 5 target cities state they have combined roof insulation in their home, while the most rarely used insulation is made of Styrofoam, except among the citizens of Struga where mineral wool is the least used as roof insulation. One out of 10 citizens does not know if and what kind of roof insulation they have in their homes, except among the citizens of Gostivar, where 21% of the respondents are uninformed.

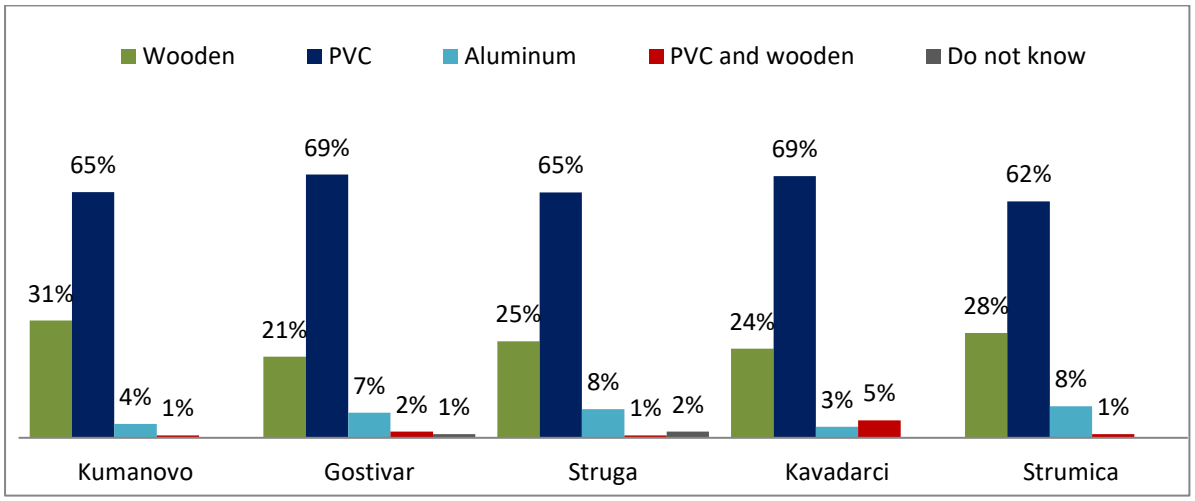
In terms of gender differences, just as in the previous question, there is a significant difference in the answer "I do not know", which indicates that women (21%) are less familiar with the type of roof insulation in their home.

Chart 26: 24. What type of roof insulation do you have in your home?



As for the type of windows in their home, the most frequent answer was PVC windows, stated by 2/3 of the respondents. The wooden windows are far behind PVC windows, but are still in use in 3 out of 10 households in Kumanovo and Strumica, they are used by one fifth of the households in Kavadarci and Struga and by 21% of the citizens of Gostivar, which is the lowest presence of wooden windows in all five cities. The aluminum type of windows is mentioned in isolated cases.

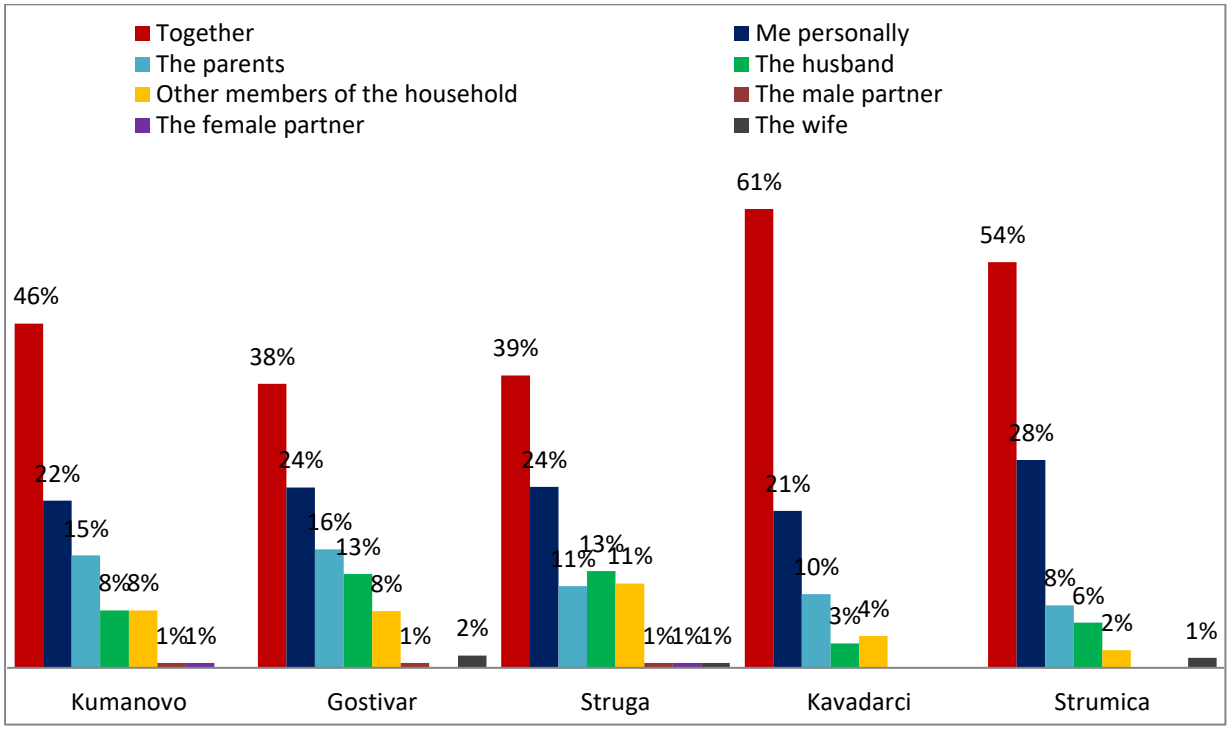
Chart 27: Q25. What type of windows do you have in your home?



Decisions related to the implementation of measures for the energy efficiency of the home are mostly made together among the household members in all 5 cities. However, when analyzing the answers separately among the cities, bigger differences are noticed.

These differences are particularly noticeable in the responses between men and women to this question. Namely, men (51%) are the ones who appear more often than women (15%) as decision makers in their home regarding the implementation of energy efficiency measures in their home. The additional analysis shows that men in all categories of personal monthly income, in a certain percentage (between 70% and 16%), appear as the bearers of these decisions, while women without income (5%) almost never appear as bearers of this type of decisions. This indicates the existence to a certain extent of stereotypical positions regarding the decision-maker in the home, i.e. the positioning of the man as the head of the family. In terms of cities, in Gostivar this difference in making decisions related to home energy efficiency measures by men (66%) is the most prominent.

Chart 28: Q26. Who in your family makes the decisions related to implementing the measures for energy efficiency in your home?



According to the data of the Ministry of Environment and Physical Planning[2], from all five cities where the research took place, the highest number of registered exceedances of the average daily limit value[3] (50 µg/m3) for PM10 in the current year (total number of days) is

[2] There is no air quality measuring station in Struga installed by the Ministry of Environment and Physical Planning.

[3] Source: Ministry of Environment and Physical Planning, air quality web platform, exceedances up to: 10-08-2023 00:00

54 in Strumica, 49 in Kavadarci and 41 in Gostivar (the permitted number of exceedances per year is 35). No exceedances were registered in Kumanovo.

Apart from the poor air quality during the heating season, most of the respondents (66%) in all 5 cities are not interested in changing the current heating system of their home – more efficient and less harmful for the environment. These answers are a clear indicator of the negative impact of the energy and price crisis on the household budget.

The most interested in investments are the interviewed citizens from Gostivar (26%), Strumica (23%) and Kavadarci (20%), the cities with the highest percentage of citizens who heat their homes with firewood. When it comes to choosing three priority investments for energy savings, only in Gostivar the replacement of the heating body is mentioned as the second choice. In all other cities, the highest priorities are: installation of solar systems and external wall insulation (facade).

If they were to change the current way of heating their home, the citizens are largely interested in recommendations and experiences from relatives, friends and neighbors (mostly in Kumanovo and Struga with 37% positive answers), followed by satisfied citizens and experts (from 15% to 18% positive responses). Low trust in institutions is evident in all five cities, only 2% to 4% of the respondents answered that they would trust the municipality the most for recommending an energy-efficient solution for saving energy. On the other hand, the large number of answers that they do not trust anyone is surprising, especially in Strumica (35%), Gostivar and Kavadarci (30% in each of these two cities). This percentage is the lowest in Struga, only 20%. Men in a higher percentage (32%) than women (25%) do not trust anyone, while women in a higher percentage (35%) than men (29%) show more trust in recommendations from relatives, friends and neighbors.

INSPECTION SERVICES AND POLICIES

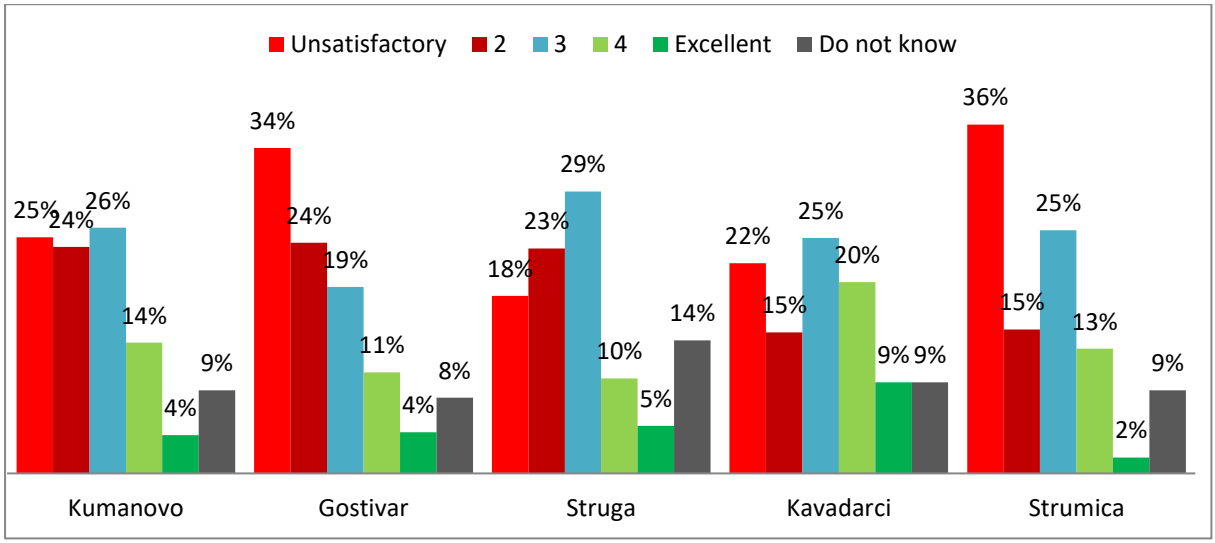
In terms of dealing with problems in the environment, the respondents generally evaluate the work of the inspection service within the municipality as unsatisfactory.

The citizens of Strumica (36%) are the most dissatisfied and singled out the lowest grade for the inspection service within the municipality in terms of dealing with environmental problems in most of the cases. Still, the aggregated answers from the two lowest ratings show that over half of the citizens of Gostivar (58%) are also dissatisfied with the work of the inspection service within the municipality in terms of dealing with environmental problems.

The greatest satisfaction with the work of the inspection service within the municipality in terms of dealing with environmental problems was expressed by the citizens of Kavadarci, where almost one third (29%) gave the highest grades for their work. The satisfaction with the work of the inspection services is almost twice as low among the respondents of all other cities.

Although the differences in the responses between men and women are small, it is still noticeable that men from Kavadarci, Strumica and Struga express a greater degree of dissatisfaction with the work of the inspection services than women. In Gostivar women are by a certain percentage less satisfied with the work of the inspection services than men.

Chart 29: Q27_1 Generally speaking, how would you evaluate the work of the inspection service within the municipality in terms of dealing with environmental problems?



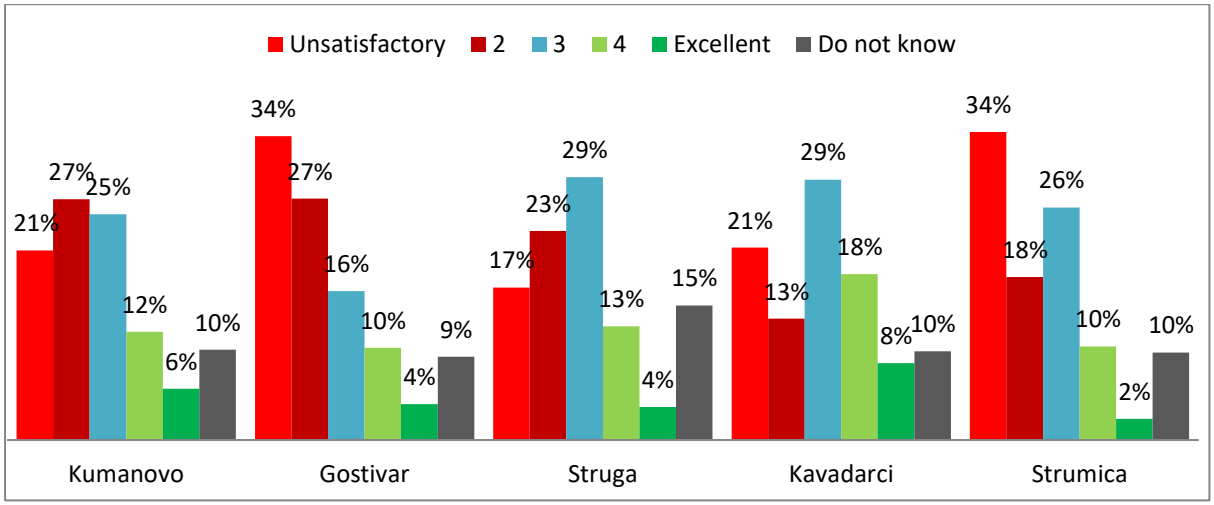
The respondents generally assess the work of the inspection service within the municipality in terms of transparency as unsatisfactory.

The most dissatisfied are the citizens of Gostivar, where one third (34%) of the citizens gave the lowest grade for the inspection service within the municipality in terms of transparency.

Still, the aggregated answers from the two lowest grades show that about half of the citizens of Kumanovo and Strumica are also dissatisfied with the work of the inspection service within the municipality in terms of transparency. Most of the citizens of Struga and Kavadarci gave the average grade of 3 for the work of the inspection service within the municipality in terms of transparency.

In terms of gender, there are slight differences in the answers. Namely, in 4 cities, apart from Gostivar, men (52%) express a greater degree of dissatisfaction with the work of the inspection service within the municipality in terms of transparency. In Gostivar women (59%) are the ones who are more dissatisfied with the work of the inspection services in terms of transparency.

Chart 30: Q27_2 How would you evaluate the inspection service within the municipality in terms of transparency?



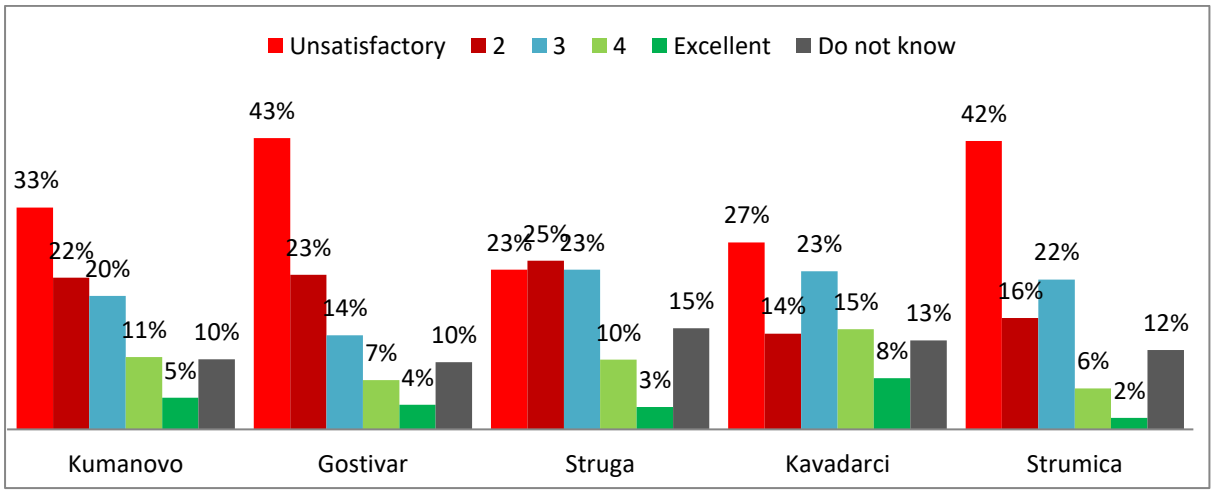
The respondents evaluate the work of the inspection service within the municipality as unsatisfactory in terms of dealing with corruption.

The most dissatisfied are the citizens of Gostivar and Strumica, where 4 out of 10 citizens singled out the lowest grade for the inspection service within the municipality in terms of dealing with corruption. The aggregated answers from the two lowest grades show that about half of the citizens of Kumanovo and Struga are also dissatisfied with the work of the inspection service within the municipality in terms of dealing with corruption.

Just as the previous question about inspection services, there are slight differences in the answers in terms of gender. Again in 4 cities, except for Gostivar, men express a higher degree of dissatisfaction with the work of the inspection service within the municipality in terms of dealing with corruption. In Gostivar women (47) express a greater percentage of dissatisfaction with the work of the inspection services in terms of dealing with corruption.

In terms of positive grades, 22% of the citizens of Kavadarci gave the highest grades to the inspection service within the municipality to a greater extent compared to the rest of the citizens from the cities included in the research in terms of dealing with corruption.

Chart 31: Q27_3 How would you evaluate the inspection service within the municipality in terms of dealing with corruption?

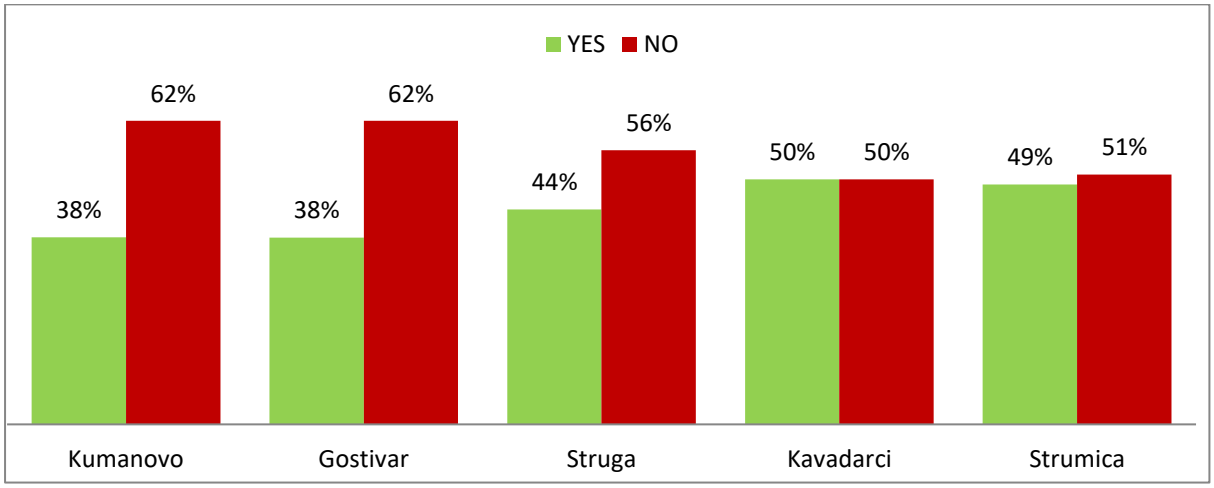


The respondents' dissatisfaction with the work of environmental inspection service in all municipalities raises the concern, but it is closely related to the lack of identified transparency and public involvement in decision-making related to environmental and health protection, including air quality.

Citizens' lack of information about where to report a problem related to environmental pollution in the municipality is highest in Kumanovo and Gostivar, where 6 out of 10 respondents do not know where to report a problem related to environmental pollution in the municipality. The citizens of Struga, Kavadarci and Strumica are divided in terms of their awareness, that is, every second respondent knows or does not know where to report a problem.

In terms of the answers to this question by men and women, there is diversity in these 5 target cities. Namely, women in Kavadarci and Kumanovo (54% and 42%) are those who express higher percentage about familiarity where to report a problem related to environmental pollution in the municipality, while in Strumica, Gostivar and Struga men express higher percentage (53%, 51% and 50%).

Chart 32: Q28_1 Do you know where to report a certain problem related to environmental pollution in your municipality?

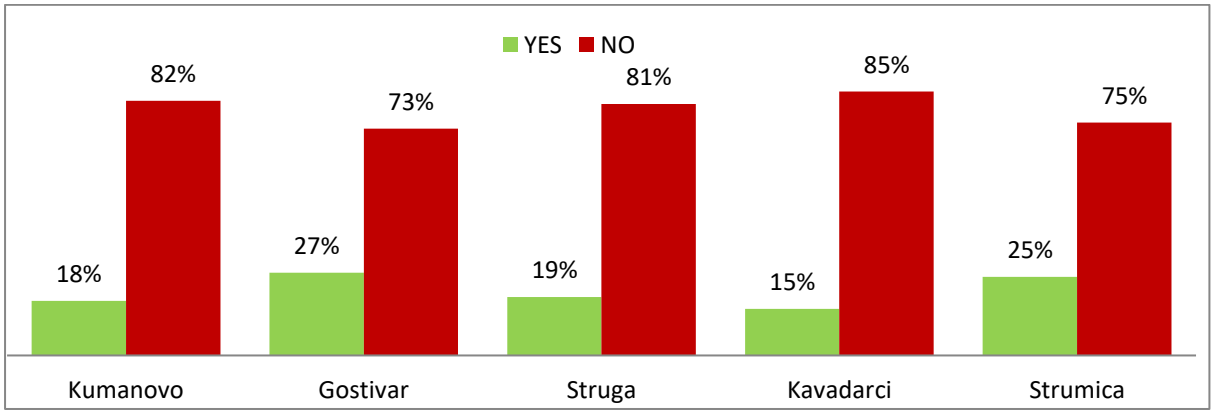


Over ¾ of the citizens in all 5 cities gave a negative answer when asked if they had been in a situation to wish to report a problem related to environmental pollution in the municipality. These negative answers are more often noticed among the citizens of Kavadarci, Kumanovo and Struga, where 8 out of 10 respondents have not wished to report a problem related to environmental pollution in their municipality so far.

There are no gender differences in terms of the answers to this question. Only in Kumanovo and Struga men express higher percentage than women for being in a situation when they wished to report a problem related to environmental pollution in the municipality.

On the other hand, ¼ of the answers of the citizens of Gostivar and Strumica are positive, that is, they wished to report a problem related to environmental pollution in their municipality.

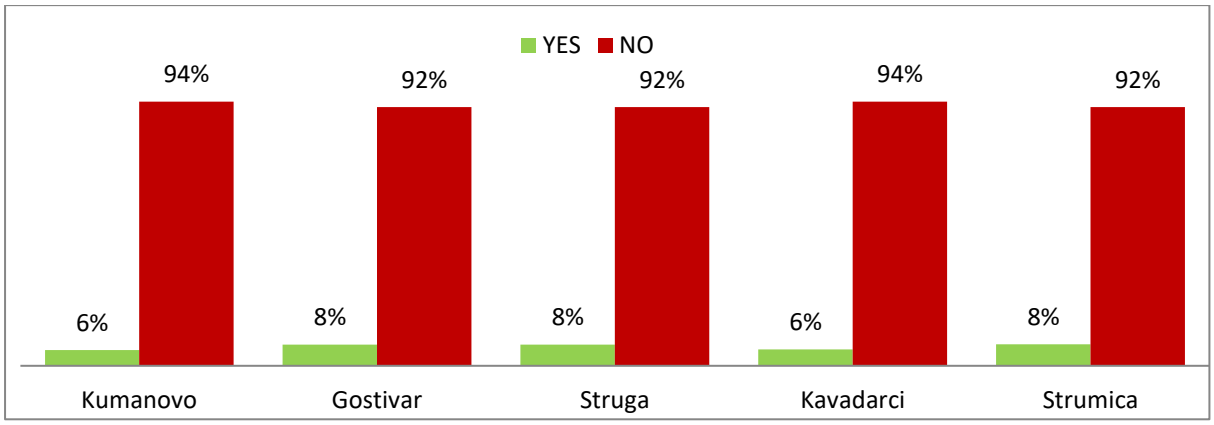
Chart 33: Q28_2 Have you ever wished to report a problem related to environmental pollution in your municipality?



The practice of not reporting a problem related to environmental pollution in the municipality is reflected in the answers to the next question, where over 90% of all respondents in all five cities gave a negative answer.

In terms of whether they have reported a problem related to environmental pollution, there is a slight difference in the responses between men and women, with men appearing more often as an active agent reporting such a problem in all 5 target cities. This again points to differences in practices and attitudes between genders.
Among those 7% in average of positive answers, that is respondents who reported a problem, dissatisfaction prevails with the way the Inspectorate/Municipality acted upon their report.

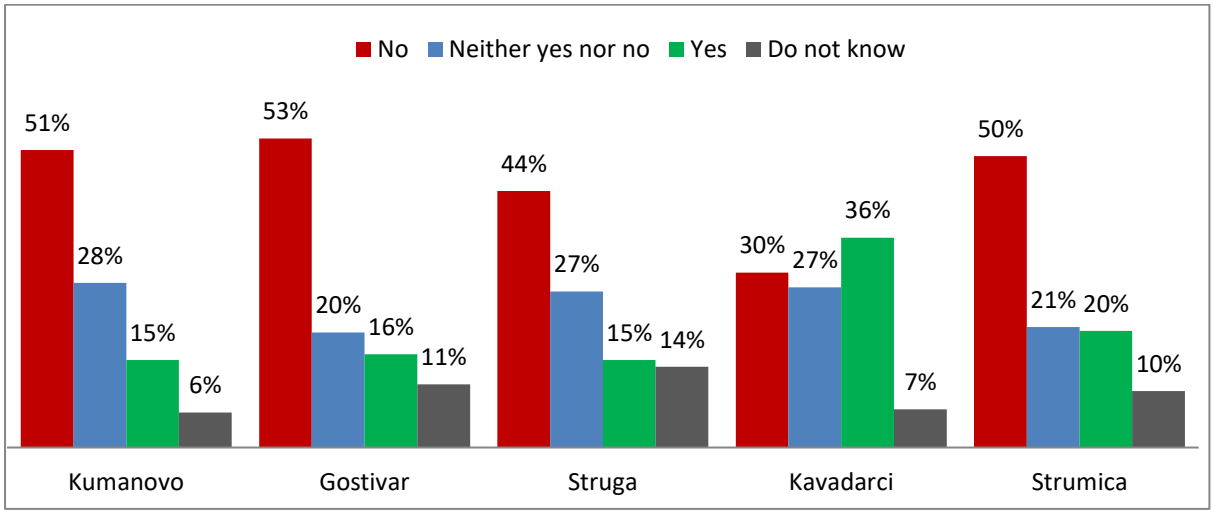
Chart 34. Q28_3 Have you reported a problem related to environmental pollution in your municipality?



About half of the citizens of Kumanovo, Gostivar and Strumica think that the inspection service within the municipality generally does not work in the service of the citizens and does not protect their interests. This dissatisfaction is lower among the citizens of Struga, where 4 out of 10 respondents stated the inspection service within the municipality did not work in favor of the citizens. Only in Kavadarci, despite the fact that one third of the citizens are dissatisfied, more positive responses prevail, that is, satisfied citizens from the inspection service within the municipality.

These satisfied citizens of Kavadarci are almost twice as numerous compared to the other four cities.

Chart 35: Q30. Generally speaking, do you think the inspection service within the municipality works in favor of the citizens and protects their interests?



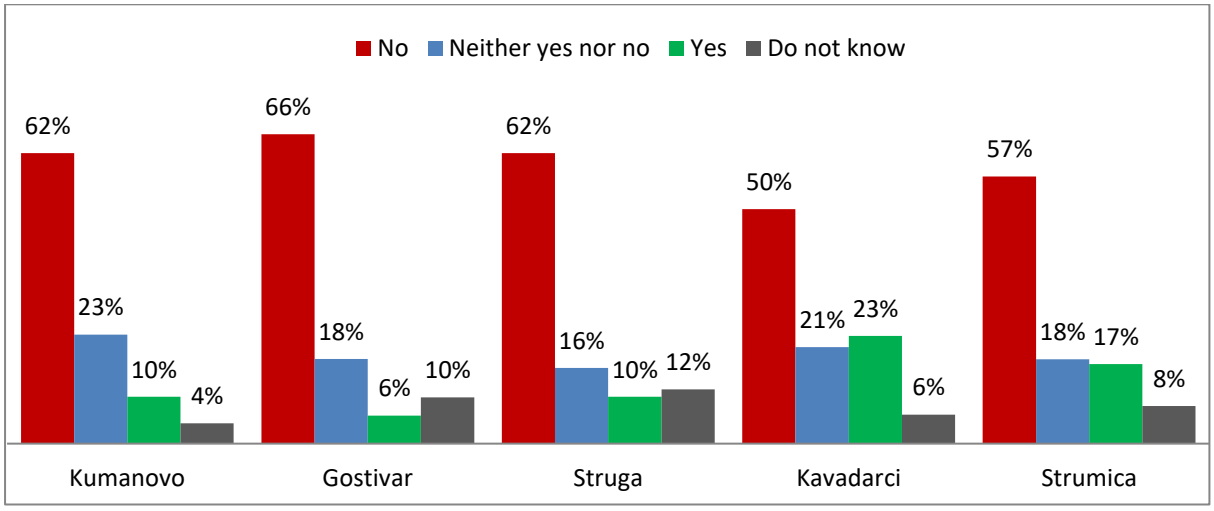
6 out of 10 citizens of Kumanovo, Gostivar, Struga and Strumica believe they are not sufficiently consulted by the municipality in making decisions related to environmental protection and health.

This dissatisfaction is less among the citizens of Kavadaci compared to the other cities. Still, most of the citizens of Kavadarci do not consider they were consulted by the municipality.

In terms of positive responses, i.e. satisfied citizens with how much they were consulted by the municipality in making decisions related to environmental protection and health, they are once again observed more often in Kavadaci (23%) than in the other 4 cities. The satisfied citizens of Kavadaci are twice as many compared to the citizens of Struga (10%) and Kumanovo (10%) and even 4 times more than the citizens of Gostivar (6%), where they are the least satisfied with how much they were consulted by the municipality in making decisions related to environmental protection and health.

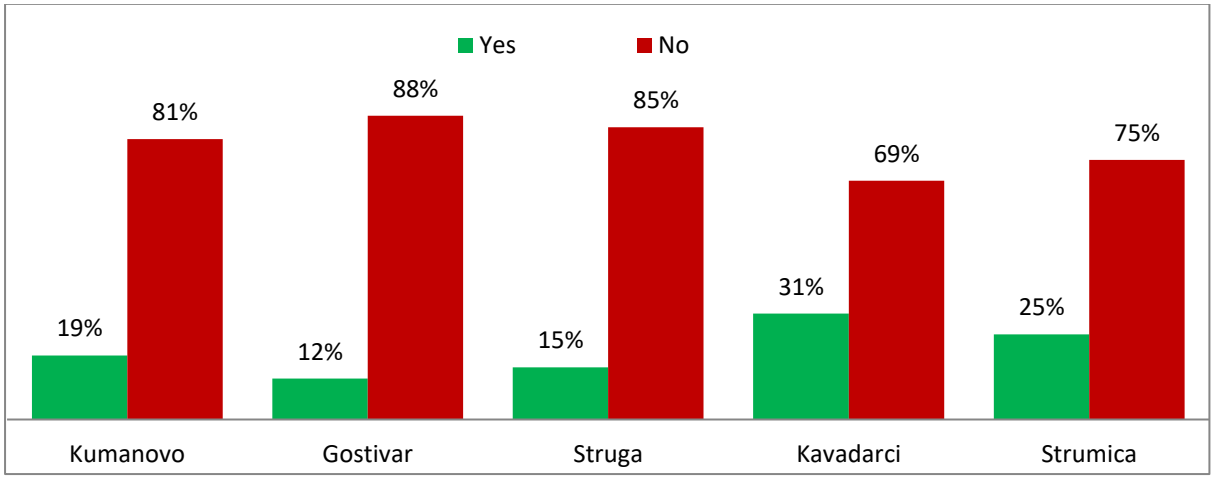
From a gender perspective, a larger percentage of women (60%) believe they are not sufficiently consulted by the municipality in making decisions related to environmental protection and health, with the exception of Strumica (17%) and Kvadarci (28%). This indicates the need for municipalities to approach citizens in a different way, especially the municipality of Gostivar, where the percentage of insufficient consultation is the highest.

Chart 36: Q31. Do you think you are consulted enough by the municipality when making decisions related to protecting the environment and health (through various forums, debates, meetings, gatherings…)?



The measures implemented by the municipality for improving the air quality are more often unfamiliar among the citizens of all 5 interviewed cities. Namely, over 80% of the citizens of Gostivar, Struga and Kumanovo gave a negative answer to this question, while 7 out of 10 citizens of Strumica and Kavadarci expressed absence of being informed about these measures. As opposed to these respondents, those who know the measures implemented by the municipality for improving air quality are more often met in Kavadarci, where 31% are informed, while the number of informed citizens in Struga (15%) and Gostivar (12%) is twice as low.

Chart 37: Q32. Do you know what measures the municipality implements to improve air quality?



Citizens' lack of information about where to report a certain problem related to environmental pollution is very high in all municipalities, but on the other hand, the lack of interest of the citizens themselves to notice a problem is also evident (8 out of 10 respondents have so far not wanted to report a problem related to polluting the environment in their municipality at

all), as well as to get involved in the process of creating local environmental and health policies (even though they have shown indications of deteriorating health due to poor air quality) and to become more familiar with the measures implemented by their municipality to improve air quality.

The following set of questions refers to the citizens' opinion on the priorities in the implementation of six proposed measures:

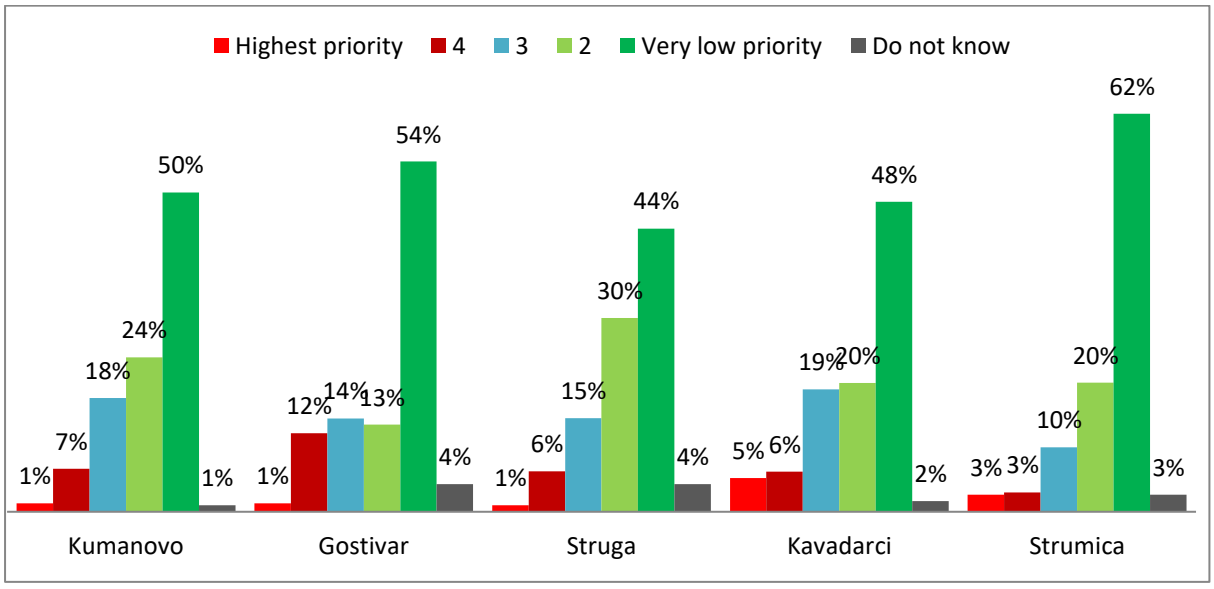
- creation of a new park-forest
- creation of a bicycle path
- installing containers for sorting domestic waste
- installing energy-efficient facades to the schools
- replacing old windows with new ones in school buildings
- installing photovoltaic panels for energy production in public facilities

Regarding the measure for creating a new park-forest, the citizens of all five interviewed cities gave the highest grades to the greatest extent.

It seems that this priority is greater for the citizens of Strumica compared to the citizens of the other cities, taking into consideration the aggregated two highest grades from their answers, which shows that even 82% of citizens underline the creation of a new park-forest, as opposed to 68% of the citizens of Gostivar and Kavadarci who also think that creation of a new park-forest is a priority.

There are no significant gender differences in terms of this question, but for women it is a slightly higher priority compared to men.

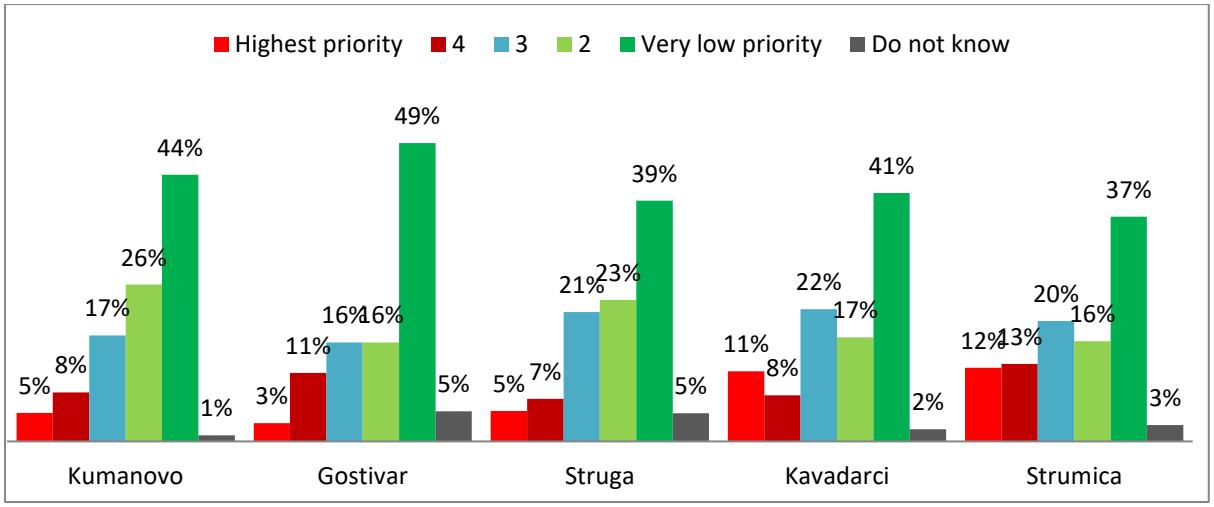
Chart 38: (Q33_1) What priority do you think should be the implementation of the following measure in your city: the creation of a new park-forest?



Regarding the measure for the creation of a bicycle path, the aggregated two highest grades from the responses show that this is the highest priority in Kumanovo (69%) where 7 out of 10 citizens consider it as a high priority, while half of the citizens of Strumica believe that the creation of a bicycle path is a priority.

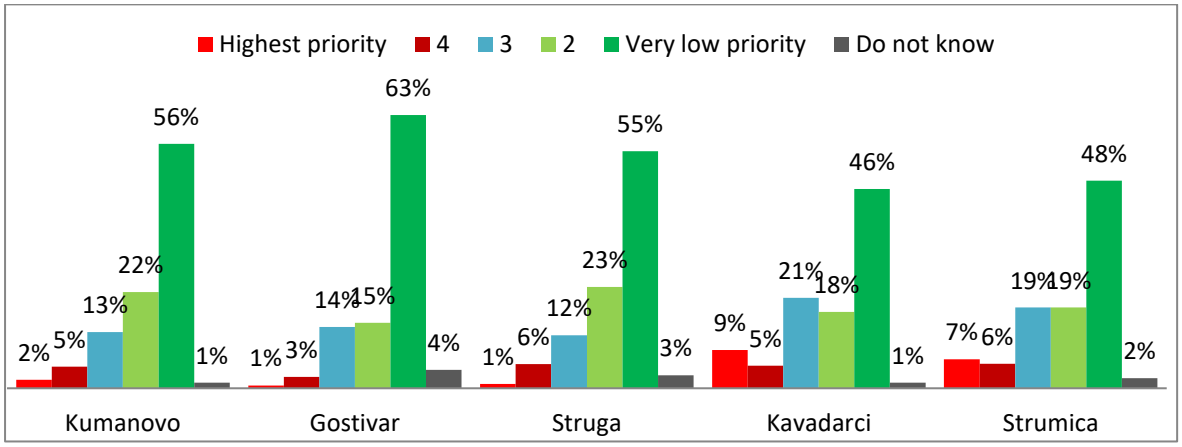
Although the creation of a bicycle path is in the priorities of both men and women, it is still a slightly higher priority for women than for men.

Chart 39: (Q33_2) What priority do you think should be the implementation of the following measure in your city: creation of a bicycle path?



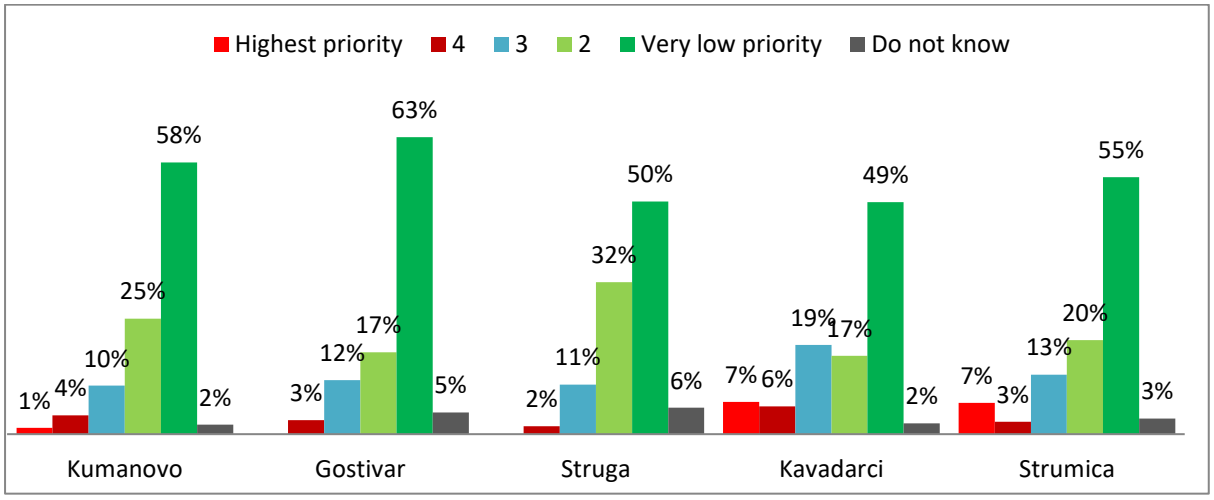
When it comes to the measure for installing containers for sorting domestic waste, the aggregated two highest grades of the answers show that this measure is the highest priority for the citizens of Kumanovo, Gostivar and Struga, where 8 out of 10 citizens think that it is a high priority, while this is less in relation to the rest or 2/3 of the citizens of Strumica and Kavadarci who consider that the installation of containers for sorting domestic waste is a priority. There are no statistically significant differences among the answers to this question in terms of gender.

Chart 40: (Q33_3) What priority do you think should be the implementation of the following measure in your city: installing containers for sorting domestic waste?



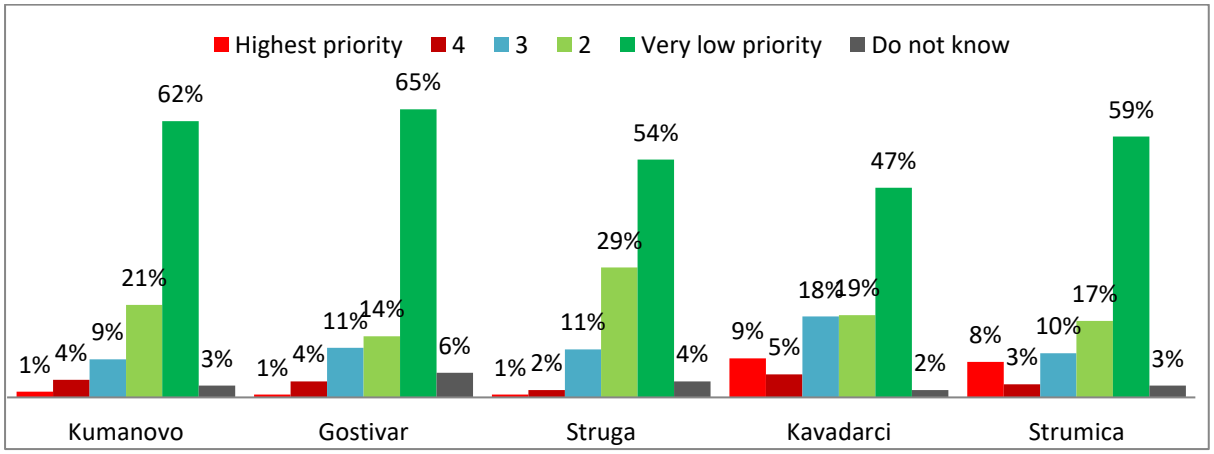
Regarding the measure for installing energy-efficient facades on schools, the aggregated two highest grades from the answers show that it is the highest priority for the citizens of Kumanovo, Gostivar and Struga, where 8 out of 10 citizens consider it a high priority, while this is less among the rest of the respondents, or 75% of the citizens of Strumica and 66% of the citizens of Kavadarci who believe that installing energy-efficient facades on schools is a priority. There are no statistically significant differences among the answers to this question in terms of gender.

Chart 41: (Q33_4) What priority do you think should be the implementation of the following measure in your city: installing energy-efficient facades to the schools?



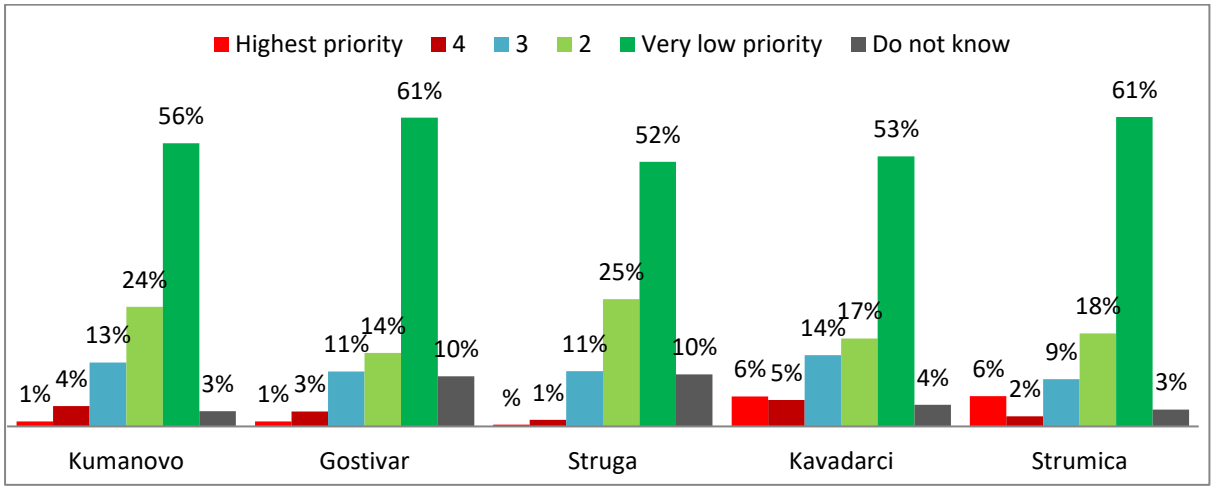
Regarding the measure to replace old windows with new ones in school facilities, the aggregated two highest grades from the answers show that it is the highest priority for the citizens of Kumanovo, Gostivar and Struga, where 8 out of 10 citizens consider it a high priority, while this is less expressed among the citizens of the other cities, where 76% of the citizens of Strumica and 66% of the citizens of Kavadarci believe that replacing old windows with new ones in school facilities is a priority. There are no statistically significant differences among the answers to this question in terms of gender.

Chart 42: (Q33_5) What priority do you think should be the implementation of the following measure in your city: replacement of old windows with new ones in school facilities?



Regarding the measure for installing photovoltaic panels for energy production in public facilities, the aggregated two highest ratings from the answers show the greatest agreement, that is, the most similar answers that it is a big priority. Namely, 7 out of 10 citizens of all five cities included in the research believe that installation of photovoltaic panels for energy production in public facilities is a priority. There are no statistically significant differences among the answers to this question in terms of gender.

Chart 43: (Q33_6) What priority do you think should be the implementation of the following measure in your city: installation of photovoltaic panels for energy production on public facilities?



The following summary table shows the aggregated two highest ratings from the responses for each measure separately, where it can be illustratively seen which measure is rated as priority in each city separately. It is worth pointing out that citizens show interest in measures related to schools (as places where their children spend a significant part of the day), as well as in the positive effect park-forests have instead of ordinary lawns or green areas. Interest in measures related to public facilities is lower by 10% on average when compared to the measures mentioned above.

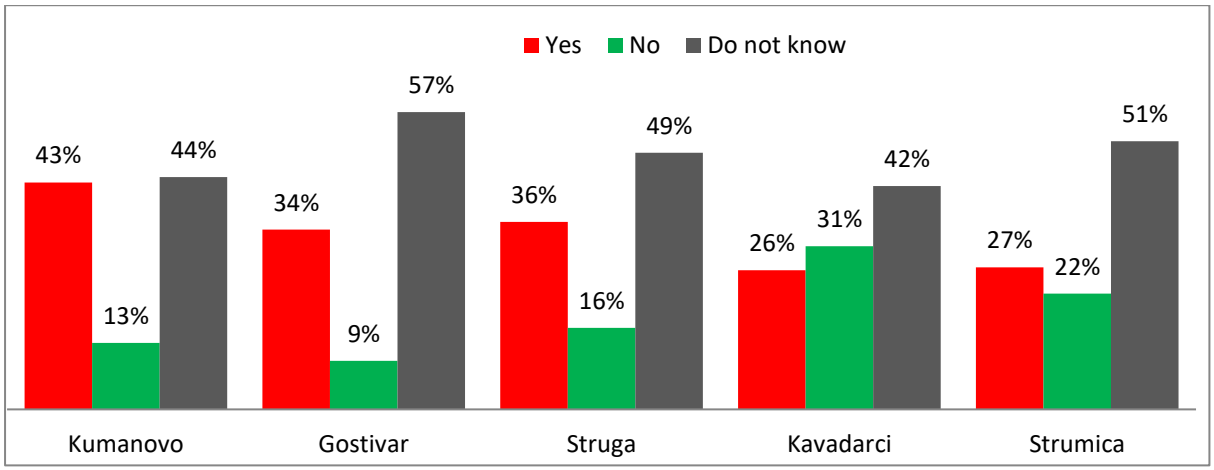
	Kumanovo	Gostivar	Struga	Kavadarci	Strumica
	Aggregated highest grades (4 and 5)				
New park-forest	73%	68%	74%	68%	82%
Bicycle path	69%	65%	62%	58%	53%
Installing containers for sorting domestic waste	79%	78%	78%	64%	67%
Installing energy-efficient facades to the schools	82%	81%	82%	66%	75%
Replacement of old windows with new ones in school facilities	83%	79%	83%	66%	76%

Installing photovoltaic panels for energy production on public facilities	79%	75%	77%	71%	79%

According to the respondents' answers to the following question, it can be noticed that most of them have not thought about changing the façade, windows or the way a public facility is heated at all (hospital, school, kindergarten, municipality building).

The citizens of Kumanovo most often underline that there are public facilities in the city that urgently need a new energy-efficient façade or they need to have the windows or the heating system changed. One third of the citizens of Gostivar and Struga think that changes are necessary, while 26% of the respondents of Kavadarci share the same opinion. The respondents of Kavadarci also express the highest number of answers that façade changes, windows replacement or changing the way certain public facilities in the city are heated are not necessary (31%).

Chart 44: (Q34) In your opinion, is there any public facility in the city that should urgently have a new energy-efficient façade installed, windows changed or modifications in the way the facility is heated?



All five suggested measures in this questionnaire are well accepted, since 70% of the answers are positive. The bicycle path is of the least interest, but still 50% of the respondents gave a positive answer in terms of this suggested measure. The installation of containers for sorting domestic waste is still a priority (with almost 70% positive answers), which leads to a conclusion that waste (as well as the pollution that is caused by burning it) is a significant problem.

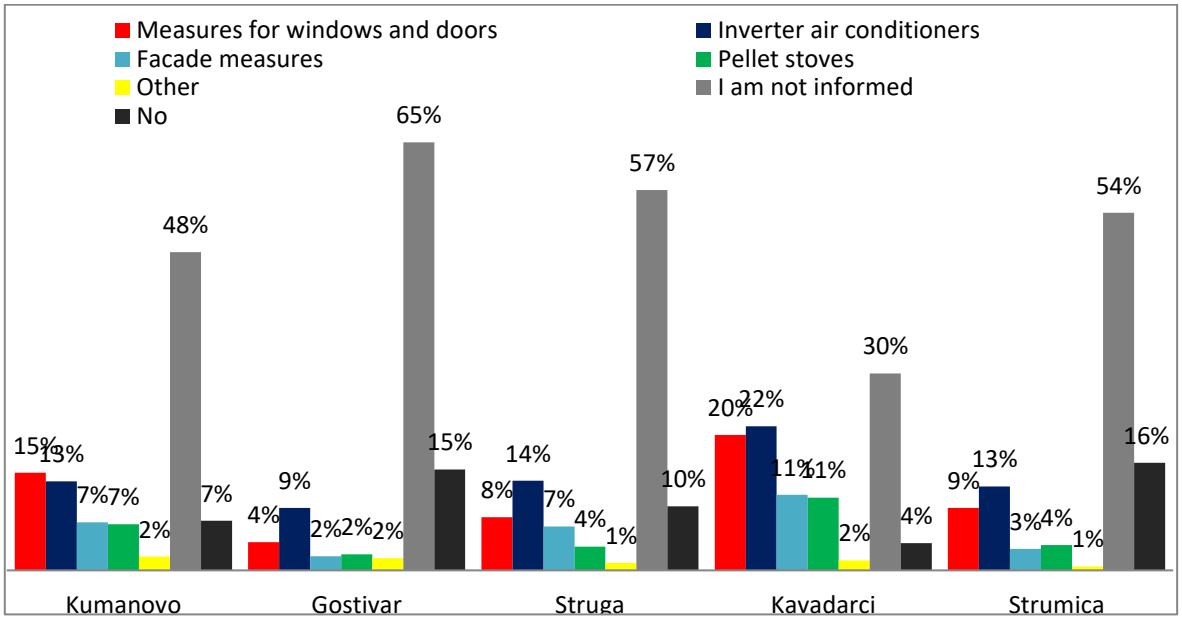
SUBSIDIES

The citizens of these five cities are mostly uninformed about a subsidized programme for energy efficiency in their municipality, which is a certain measure for helping the households. These uninformed citizens are more often observed in Gostivar and Struga, where 6 out of 10 citizens have not heard of a subsidized programme, while in Kumanovo and Strumica, half of the citizens have also not heard of a subsidized programme for energy efficiency.
The percentage of uninformed citizens is the lowest among the citizens of Kavadaci and is 30%. At the same time, one fifth the citizens of Kavadarci answered that there was a subsidized programme for energy efficiency in the municipality, through measures for windows and doors and inverter air conditioners. 11% of the responses are allocated to the subsidized programme for pellet stoves. The same percentage is allocated for facade measures, as well.

When it comes to the citizens of Kumanovo, there are also responses for a subsidized programme for window and door measures (15%) and inverter air conditioners (13%), 7% for pellet stoves and 7% for facade measures.
When it comes to citizens of Gostivar, 1 out of 10 citizens is informed about the subsidized programme for inverter air conditioners, while among the citizens of Strumica, this percentage is 13%.

The most categorical citizens that there is no subsidized programme for energy efficiency in the municipality, as help for households, are those from Strumica (16%).
Both men and women from all five cities are equally uninformed about whether there is a subsidized programme for energy efficiency to help households.

Chart 45: Q35. Is there a subsidized programme for energy efficiency in your municipality, which helps the households?

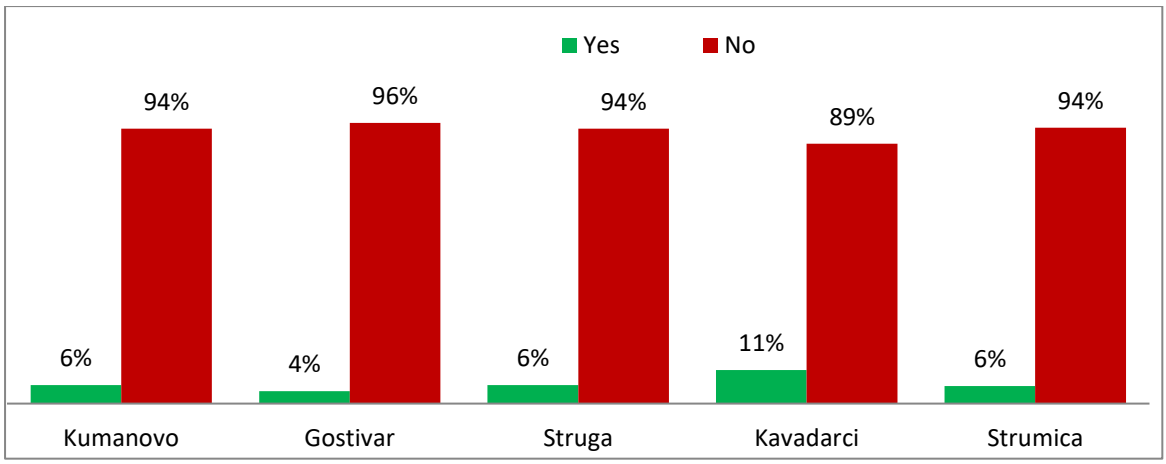


Even 9 out of 10 citizens in all five cities have not applied to a call for subsidies for energy-efficient solutions so far. Only in Kavadarci 1 out of 10 respondents reports about experience with submitting an application to a call for subsidies for energy-efficient solutions.

Half of the citizens who have experience with submitting applications submitted the applications in the Municipality, while the other half submitted them in the Ministry of Economy.

An interesting fact is that men from the municipalities of Kavadarci and Kumanovo are those who more often applied in the municipality, while women more often applied in the Ministry of Economy. The situation in Gostivar, Strumica and Struga is other way around. A greater percentage of women (between 66.7-55.6%) applied in the municipality, while men (between 57.1-50%) applied in the Ministry of Economy. This points to the need for a different way of informing citizens about these measures by the municipality and the ministry.

Chart 46: Q36. Have you applied to a call for subsidies for energy efficient solutions?



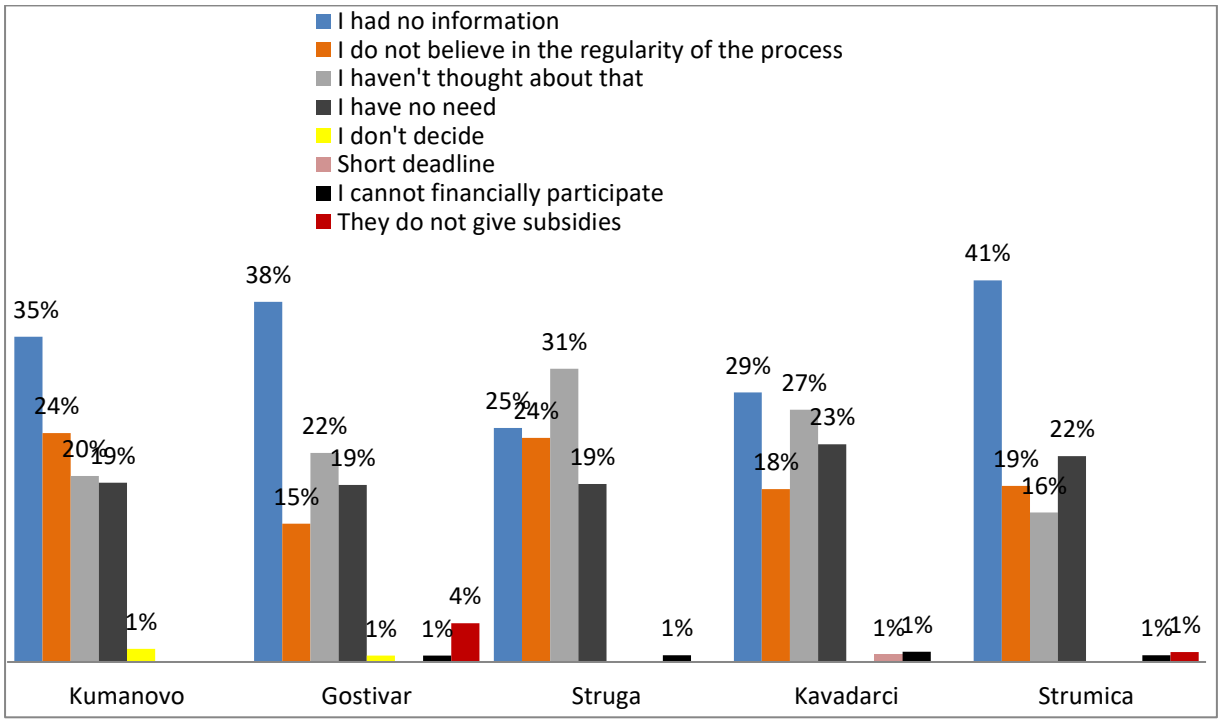
Furthermore, when asked why they have not applied for a subsidized programme for energy efficiency, as help for households, the citizens' lack of information, inertia and lack of interest in changing the existing solutions in their home with energy-efficient ones are mentioned once again.

About one-fifth of the respondents do not need any change, but there are also responses indicating dissatisfaction with the regularity of the process. These skeptical citizens who do not trust the regularity of the process of applying for a call for subsidies for energy-efficient solutions are more commonly encountered in Kumanovo and Struga (24%).
Although the main reason for not applying is that the citizens of these cities had no information about the application process, it is additionally noted that in terms of other answers, women did not think about it to a slightly greater extent, while men did not apply because they did not believe in the regularity of the process. This indicates the need for more measures for the inclusion of women in social processes by the municipality, but also for the appropriate manifestation of the regularity of the process.

The additional analysis shows that the most vulnerable category, women without personal monthly income, did not apply because they had no information about this process, and at the same time they are not the decision-makers in the family.

Once again, the data point to the need for adequate information, the inclusion of citizens, especially women, in the decision-making processes, but also in the demonstrated results that would influence increased trust from citizens.

Chart 47: Q38. Why haven't you applied until now?



REPORT ON THE OPINION OF THE REPRESENTATIVES OF LOCAL SELF-GOVERNMENT AND PUBLIC INSTITUTIONS FROM STRUMICA, KAVADARCI, KUMANOVO, STRUGA AND GOSTIVAR

The conducted research aimed to assess the awareness of air pollution problems of local decision-makers (representatives of local self-government and public institutions) and their readiness and commitment to implement specific measures to improve air quality in the city.

The research was conducted in the following cities: Strumica, Kavadarci, Kumanovo, Struga and Gostivar, through the face-to-face interview method.

A total of 150, that is, 30 representatives from the local self-government and public institutions in each municipality, were interviewed.

In terms of the interest for detecting and measuring the air pollution sources in the city, identifying and planning adequate measures for solving the problems, relevant information is obtained with the collected data, which can also be used for preparation of activities for raising the awareness, as well as for strategic planning and decision-making processes.

The obtained information is in function of the general goal of the UNDP project, which aims to further strengthen the capacities of local self-governments to design, plan, implement and monitor local action plans aimed for improving air quality and increasing knowledge and awareness of issues related to air pollution. Special attention will be paid to strengthening the capacities of local self-governments to assess the opportunities and barriers for meaningful participation of women in catalyzing clean air action and how to integrate a gender perspective in the adaptation of measures for improving air quality.

The first set of questions for the representatives of the local self-government and public institutions referred to the extent of pollution and the sources of air pollution in the city.

All respondents from Strumica and Kumanovo agree that air pollution in the city is a big problem. In the rest of the cities, the representatives of the local self-government and public institutions have divided opinions. In Gostivar, ¾ of the respondents think that pollution is a big problem, while more than half of the respondents from Kavadarci think that pollution in their city is neither a big nor a small problem. As far as the respondents from Struga are concerned, the distribution of the data shows that one third of the representatives consider that air pollution is a small problem, which is an interesting data, especially since these percentages are completely absent in other cities.

	Kumanovo	Gostivar	Struga	Kavadarci	Strumica
A big problem	97%	77%	37%	43%	100%
Neither a big, nor a small problem	3%	23%	30%	57%	
A small problem			33%		

When analyzing the answers of the representatives of the local self-government and public institutions, related to the source that contributes the most to air pollution in the city, interesting findings are noted. Namely, Industry as a source of air pollution is most often mentioned in Kavadarci, while it is not mentioned at all in Strumica. Household heating and waste burning were detected as the biggest polluters in Strumica. The waste burning in illegal landfills is the biggest source of pollution in Struga, while transport is the most frequently mentioned source of pollution in Kumanovo. The answers are divided only among the representatives of the local self-government and public institutions in Gostivar and five listed sources that contribute to air pollution in the city are mentioned.

	Kumanovo	Gostivar	Struga	Kavadarci	Strumica
Industry	3%	13%	7%	43%	
Transport	43%	27%	10%	13%	3%
Construction		23%	7%	3%	
Household heating	37%	13%	17%	33%	57%
Waste (burning waste in illegal landfills)	17%	23%	57%	7%	40%
Agriculture (agricultural crops and stubble burning)			3%		

The table below shows the respondents' answers about the extent to which all seven mentioned sources contribute to air pollution in their city.

The respondents from Kumanovo mostly point out that the source of pollution in their city is transport and household heating, while for respondents from Gostivar underline construction as the biggest contribution to air pollution in their city.

Even 90% of the respondents of Struga believe that burning waste in illegal landfills contributes to pollution, while the respondents from Kavadarci, as already mentioned, believe that industry is the greatest polluter, while a high percentage of answers identify the heating of public facilities and households as an important polluter.

The respondents from Strumica, on the other hand, point out that burning waste in illegal landfills and the heating of households are the biggest polluters of the city, but it is an interesting fact that in relation to all other municipalities, the heating of public institutions in this city is not rated as a source of pollution.

		Kumanovo	Gostivar	Struga	Kavadarci	Strumica
Industry	It does not contribute at all	33%		40%		
	2	20%	3%	33%	3%	17%
	3	37%	37%	7%	10%	60%
	4	7%	43%	10%	43%	23%
	It contributes a lot	3%	17%	10%	43%	
Transport	It does not contribute at all			10%		
	2	3%	23%	47%	3%	3%
	3	20%	13%	27%	20%	43%
	4	27%	30%	7%	67%	30%
	It contributes a lot	50%	33%	10%	10%	23%
Construction	It does not contribute at all	20%	3%	3%		
	2	57%		23%		17%
	3	23%	23%	37%	20%	57%
	4		50%	17%	77%	17%
	It contributes a lot		23%	20%	3%	10%
Household heating	It does not contribute at all	3%		3%		
	2	7%		20%		7%
	3	17%	30%	7%	13%	13%
	4	17%	47%	40%	47%	17%
	It contributes a lot	57%	23%	30%	40%	63%
Public facilities heating	It does not contribute at all	13%		3%		57%
	2	20%	7%	33%		40%
	3	40%	33%	27%	13%	
	4	20%	40%	13%	73%	3%
	It contributes a lot	7%	20%	23%	13%	
Waste (burning waste in illegal landfills)	2	10%	7%			7%
	3	27%	23%	10%	20%	7%
	4	37%	40%	10%	60%	10%
	It contributes a lot	27%	30%	80%	20%	77%
Agriculture (agricultural crops and stubble burning)	It does not contribute at all	20%		67%		
	2	50%	3%	10%	13%	7%
	3	27%	50%	13%	27%	57%
	4	3%	33%	7%	60%	30%
	It contributes a lot		13%	3%		7%

The installation of photovoltaic panels for production of electricity in institutions of the local self-government and public facilities is mostly noticed in Kavadarci compared to the other 4 cities.

When it comes to energy sources used for heating the municipal facilities and the facilities of public institutions, half of them in Gostivar and almost all of them in Strumica are heated with a Central Heating System on gas, while most of the institutions in Kavadarci use heating oil.

Half of the institutions in Struga use heating oil, while the other half uses electricity for heating.

Half of the institutions in Gostivar use air conditioners for heating, but coal and heating oil are also used. The respondents from Kumanovo mention the central heating system on gas in most of the cases, but some institutions use heating oil or fuel oil as energy source for heating.

	Kumanovo	Gostivar	Struga	Kavadarci	Strumica
Coal		27%			
Firewood				3%	3%
Extra light (oil)	20%	20%	**43%**	**73%**	
LPG - Liquid petroleum gas	3%				
Electricity – air conditioner	7%	**50%**	20%	17%	3%
Electricity – heat pumps			27%		
Electricity – fan heater, electric quartz heater, panel heater		3%	10%		
Central heating system on pellets				7%	
Central heating system on gas	**50%**				**90%**
Central heating system on fuel oil	13%				
Heating oil	7%				3%

The considerations about changing the current way of heating the institution are noted from the answers of the representatives from Kavadarci and Kumanovo. Only the respondents from Strumica are exclusively satisfied with the current choice of the central heating system using gas and would categorically not change it.

If they are still hypothetically able to choose a method for heating the institution regardless of the price of the equipment installation, as well as the monthly cost, most of the respondents (except the respondents from Strumica - they already use the least polluting fuel) choose the gas central heating system more often, while among the respondents of Struga, the choice of geothermal pumps prevails.

If they would make an investment for energy-efficient heating in the institution tomorrow, as the basic criterion according to which they would make the choice, the representatives of the local self-government and public institutions would consider the price of the investment, while the monthly consumption comes second. Only the respondents from Strumica answered they would not make such an investment since they already used energy-efficient heating.

Regarding the possibility of making investments in an institution to save energy, the installation of solar systems is ranked first, followed by roof insulation, while wall insulation comes third.

The answers about the probability that in the following 12 months any of the previously mentioned investments will be made differ from city to city. Namely, the representatives from Kavadarci are almost certain that there will be investments in the following 12 months, while the responses of the representatives of Kumanovo and Struga show that the investments are not likely to happen during the following year.

	Kumanovo	Gostivar	Struga	Kavadarci	Strumica
Likely	16%	33%	7%	83%	7%
Neither likely, nor unlikely	7%	40%	33%	17%	10%
Unlikely	77%	24%	60%		20%
Refuses to answer		3%			63%

Most of the facilities where representatives of the local self-government and public institutions work have an average insulation. Only the representatives from Kumanovo stated the insulation of the facilities was bad in more than 40% of the answers.

	Kumanovo	Gostivar	Struga	Kavadarci	Strumica
Excellent insulation	10%	3%	23%		7%
Good insulation	20%	23%	33%	20%	37%
Average insulation	27%	73%	27%	70%	50%
Bad insulation	33%		3%	10%	7%
Very bad or no insulation at all	10%		13%		

The walls and roofs of the facilities where the representatives of the local self-government and public institutions work most often do not have any insulation, except in Gostivar where over 70% of the answers are that the insulation of the walls and roofs of the facilities is combined.

In terms of the windows of the facilities, PVC windows prevail, only in Gostivar prevail aluminum windows.

		Kumanovo	Gostivar	Struga	Kavadarci	Strumica
walls	Styrofoam	17%	13%	17%		20%
	Mineral wool		7%			
	Combined	10%	**77%**	27%	37%	
	Other			3%	20%	3%
	No insulation	70%	3%	50%	40%	77%
	Do not know	3%		3%	3%	
roofs	Styrofoam		13%			
	Mineral wool	30%	10%			27%
	Combined	7%	**77%**	10%	3%	7%
	Other	3%		7%		
	No insulation	50%		70%	97%	63%
	Do not know	10%		13%		3%

The following set of questions refers to the municipality's commitment to implement specific measures for improving air quality. Undoubtedly, all representatives of the local self-government and public institutions gave a positive answer that the institution they represented was committed to implement specific measures for improving the air quality in the city.

The answers related to the efforts of the municipality and the institution they represent, in which all respondents believe that it has a plan to improve air quality, are certainly in the same direction.

According to the answers of the representatives, inter-sectoral or inter-institutional coordination and communication, in which proposed measures for air quality protection are considered from different aspects before they are implemented, are the practice in all five municipalities.

The following set of questions refers to the opinion of the representatives of the local self-government and public institutions in terms of the priorities in implementing the suggested six measures:

- creation of a new park-forest
- creation of a bicycle path
- installing containers for sorting domestic waste
- installing energy-efficient facades to schools and other municipal facilities
- replacing old windows with new ones in the schools and other municipal facilities
- installing roof insulation to schools and other municipal facilities
- installing photovoltaic panels for energy production on public facilities

The respondents from Kumanovo, Kavadarci and Strumica gave the highest grades for the creation of a new forest-park.

The representatives of Kumanovo gave the highest grades for all 7 proposed measures, while for the representatives of Gostivar the highest priority is the replacement of old windows with new ones on school and other municipal facilities and containers for sorting household waste.

The representatives from Struga, Kavadarci, and Strumica prioritize the installation of photovoltaic systems for energy production on public buildings over all other proposed measures.

		Kumanovo	Gostivar	Struga	Kavadarci	Strumica
park-forest	2		17%	23%		
	3	13%	47%	20%		10%
	4	7%	23%	43%	30%	13%
	Greatest priority	80%	13%	13%	70%	77%
Bicycle path	2		17%	30%		3%
	3	10%	30%	23%		20%
	4	7%	37%	27%	27%	23%
	Greatest priority	83%	17%	20%	73%	53%
Containers for sorting domestic waste	2		3%	7%	3%	
	3	13%	13%	23%	17%	
	4	37%	57%	47%	33%	20%
	Greatest priority	50%	27%	23%	47%	80%
Energy-efficient facades to schools and other municipal facilities	2		13%	3%		7%
	3	7%	7%	20%		10%
	4	10%	30%	50%	37%	10%
	Greatest priority	83%	50%	27%	63%	73%
Replacing the old windows with new ones in schools and other municipal facilities	2	3%		3%		7%
	3	3%	13%	13%		10%
	4	7%	30%	47%	33%	7%
	Greatest priority	87%	57%	37%	67%	77%
Roof insulation for schools and other municipal	2		7%	10%		
	3	7%	23%	7%		13%
	4	10%	33%	37%	47%	17%

facilities	Greatest priority	83%	37%	47%	53%	70%
Photovoltaic panels on public facilities for producing electricity	2		3%	3%		
	3		13%	7%	3%	3%
	4	17%	30%	47%	40%	7%
	Greatest priority	83%	53%	43%	57%	90%

Regarding the existence of a subsidized programme for energy efficiency, as an assistance to households, the answers of the respondents are divided. Namely, representatives of public institutions and public enterprises are more often uninformed about a subsidized programme for energy efficiency by the municipality, while the representatives of the municipality, as noted in the table below, identified the measures that are part of a subsidized programme for energy efficiency from the municipality.

	Kumanovo	Gostivar	Struga	Kavadarci	Strumica
Facade measures	56%	33%		3%	
Windows and doors measures		37%	17%	100%	13%
Inverter air conditioners	4%	30%	17%	97%	47%
Stoves on pellets			3%	23%	13%
There are no measures for subsidized programme	11%	50%	47%		
I am not informed	30%		33%		53%

The trust of the respondents that the municipality has the capacity to solve the problems related to improving the air quality is noticed from their answers. Namely, all respondents from Kavadarci categorically claim that the municipality has the capacity to solve problems related to improving the air quality, while only half of the respondents of Gostivar share this opinion.

	Kumanovo	Gostivar	Struga	Kavadarci	Strumica
No	20%	50%	17%		13%
Yes	70%	50%	83%	100%	87%
Do not know	10%				

The following set of questions referred only to municipal employees. Bearing in mind that those questions referred to information, measures, decision-making, communication with citizens and subsidies, the representatives of the municipality are the most suitable respondents.

Almost all representatives from these five cities agree that the citizens are adequately informed by the Municipality about the sources of air pollution and the consequences of the pollution on the health of the citizens, related to whether citizens are adequately consulted by the municipality in making decisions in terms of environmental and health protection (through various forums, debates, meetings, gatherings...).
Only the representatives from Strumica have divided opinion.

There is also a high level of agreement, i.e. all respondents, representatives of the municipality, believe that socio-economically vulnerable citizens (single-parent families, families with many children, persons with motor or sensory disabilities, persons living at social risk, etc.) are properly consulted by the municipality in carrying out decisions related to environmental and health protection (through various forums, debates, meetings, gatherings).

Gender sensitivity, where women are properly consulted by the municipality in making decisions related to environmental protection and health, is highlighted in the answers only by the representatives of Kumanovo, Gostivar and Struga. One third of the respondents from Kavadarci do not think that women are adequately consulted by the municipality, while half of the representatives of Strumica share this opinion.

When asked about the level of interest among citizens for their involvement in making decisions related to environmental protection and health, the representatives of all five municipalities usually answer that it is at a medium level. Still, half of the respondents in Strumica and Kumanovo point out that the interest among citizens for their involvement in decision-making is at a low level. About a third of the respondents in Struga consider that the involvement of the citizens is at a high level, a percentage that is completely absent in the answers of the representatives from Strumica and Kumanovo.

	Kumanovo	Gostivar	Struga	Kavadarci	Strumica
On a high level		7%	36%	27%	
On a medium level	50%	73%	55%	73%	54%
On a low level	50%	20%	9%		46%

Regarding the quality of the information that the five municipalities communicate to citizens, which refer to:

- Environmental protection measures
- Air pollution issues
- Measures to protect citizens' health
- Activities carried out by the municipality for environmental protection
- Where to report a particular environmental problem

The highest average grade refers to reporting a certain ecological problem.

The respondents from Kumanovo more often gave the highest grades for the quality of information related to air pollution and the reporting of a certain environmental problem.
The respondents from Gostivar more often gave the highest grades for the air pollution issue and the activities carried out by the municipality for environmental protection.
For the representatives of Struga, the information where to report a certain environmental problem is of the highest quality, while for the respondents from Kavadarci, high grades were given for all 5 measures communicated by the municipality to the citizens.
Dispersion of all grades for all 5 measures is observed only among respondents from Strumica, on a scale from 2 to 5, where 5 represents an excellent grade.

At the moment, there are active subsidies for energy-efficient measures only through the municipalities of Kumanovo, Kavadarci and Strumica.

All respondents agree that subsidy measures are created to reflect the needs of socio-economically vulnerable categories of citizens (single-parent families, families with many children, people with motor or sensory disabilities, people living at social risk, etc.)

The representatives of the municipalities in all five cities agree that when granting the subsidies, priority should be given to all below listed categories of citizens:

- Persons with motor or sensory disabilities
- Pregnant women or families with small children
- Single parent families
- Families with many children
- Persons with low monthly incomes
- Pensioners
- Persons living in social risk

Only among the representatives of Gostivar there is a division of answers that when granting subsidies, priority should be given to pregnant women or families with small children.

The three most commonly proposed measures by the respondents representing the five municipalities that would strengthen the municipality's capacity to deal with air pollution are: increasing intersectoral cooperation, technical equipment for the inspectorate and greater financial resources.

The last answers to questions related to the information about whether the municipalities have data on the method of heating small and medium-sized companies, public institutions and households show us that only the municipality of Kavadarci has this data for almost all companies, public institutions and households, while the municipality of Gostivar has difficulties in providing this type of data.

Air pollution in the city is a **high priority** for the citizens of Strumica (80%), Gostivar (70%), Kavadarci (70%) and Kumanovo (66%), while in Struga this percentage is significantly lower (38%). The percentages of the representatives of local self-government and public institutions that identified air quality as a high priority problem are even higher in Strumica (100%), Kumanovo (97%) and Gostivar (77%), and lower in Kavadarci and Struga (where only 33% of the answers are that air quality is a minor problem). This is probably due to the fact that Struga is not part of the network of air quality measuring stations of the Ministry of Environment and Physical Planning, so people do not have accurate data on possible exceeding of gas/particle concentration limits.

The negative influence of the polluted air on people's **health** is the first and the most important consequence that the citizens recognize and that are mostly concerned about, having in mind they have already felt certain health problems due to air pollution.

Citizens' perception of the biggest **sources of air pollution** in their city is currently a personal perspective and it differs from the perspective of local government employees. For citizens, the burning of illegal landfills, industry and transport are the three biggest sources of pollution in their municipality, which leads to the conclusion that awareness of their personal and daily activities is not perceived as harmful. The administrative employees, on the other hand, believe that household heating affects the poor air quality more than the industry (with the exception of Kavadarci). The burning of stubble and agricultural crops, as well as construction, is completely out of focus for all respondents. Until the Source Apportionment Studies, which are supported by the project, are completed, the citizens of these cities will only have a subjective perception of the sources of air pollution.

The awareness of one's own contribution and responsibility for poor air quality is low, a large percentage of respondents believe that with the way they heat their home, they do NOT contribute to air pollution in the surrounding area they live in (mostly pronounced among the citizens of Kavadarci with 73%, about 60% in Strumica, Struga and Kumanovo, and in Gostivar 57%). Respondents do not perceive wood burning as a cause of poor air quality, although most of them heat their homes with wood (from 41% to 53%, depending on the city), then with an air conditioner, i.e. electricity (from 17%-41%) and pellets (5% to 16%). The fact that a good part of the respondents still uses coal, heating oil and waste for heating (a particularly large percentage observed in Strumica and Kavadarci) is surprising, despite the fact that they are aware of their negative impact on air quality.

It is necessary to point out **the wrong perception** that citizens have about **the impact of pellets** on air pollution in the city. The percentages of respondents who gave completely

opposite answers to this question ("it does not influence at all" and "it influences a lot") are very similar. In addition, in Gostivar and Struga, the impact of pellets on the air quality in the city is assessed as more harmful than the impact of firewood.

Unlike the citizens, municipal facilities, facilities of public institutions are heated with different, even very opposite energy sources: in Strumica almost all of them are heated with a gas central heating system (a positive example), while the majority of institutions in Kavadarci are heated with heating oil (negative example). Half of the institutions and facilities in Gostivar are heated with air conditioners, but coal and heating oil are also used.

When it comes to **investments for changing the current heating system** of the households with a new one – more efficient and less harmful for the environment, most of the respondents in all 5 cities express lack of interest. These answers are a clear indication of the negative impact of the energy and price crisis on the household budget. They need stimulation and favorable investment packages to even want or start thinking about investing in changing the way of heating their home.

The possibility of changing the current way of heating in the institutions is noted in the answers from Kavadarci (during the following 12 months) and Kumanovo. The respondents of Strumica are exclusively satisfied with the current choice of gas central heating system in public facilities and would categorically not change it, which is completely justified.

The answers to questions related to **energy efficiency** (insulation/windows) in homes give a seemingly satisfactory percentage of average and better insulation. Still, a deeper analysis of the answers gives a different picture: from 14% (Kavadarci) to 24% (Gostivar) of the respondents do not have or have poor insulation in their homes; this percentage reaches up to 30% for non-insulated walls, and even up to 40% for a roof without insulation. Such answers impose the conclusion that it is necessary to strengthen the awareness of citizens regarding the role of energy efficiency in reducing heating costs.

To the greatest extent, the walls and roofs of the facilities where the representatives of the local self-government and public institutions work do not have insulation, with the exception of Gostivar where all the answers are that the insulation of the walls and roofs of the facilities is average, good or excellent.

All representatives of the local self-government, as well as public institutions, gave a positive answer that the institutions were dedicated for implementing specific **measures for improving the air quality in the city**, which is confirmed with the fact that all five municipalities have adopted Plans for air quality. All respondents from Kavadarci categorically claim that the municipality has the capacity for solving the problems related to improving air quality, while only half of the respondents from Gostivar share this opinion.

However, very few citizens have **confidence** that the municipality can help them choose an energy-efficient solution for saving energy for their home (only 2% to 4% of respondents in all municipalities). What is surprising is that the citizens do not have much trust even in experts (from 15% to 18% positive answers in all municipalities), but they trust their relatives, friends and neighbors (mostly in Kumanovo and Struga with 37% positive answers). The large number of skeptical citizens who do not trust anyone is surprising, especially in Strumica (35%), Gostivar and Kavadarci (30% in each of these two cities). Respondents' dissatisfaction with the work of **environmental inspection services** in all municipalities is very high and worrying, but is closely related to the lack of identified transparency and public involvement in decision-making related to environmental and health protection, including air quality. In addition, the number of environmental inspectors is almost always small and they do not have enough time to devote to documenting their activities and sharing them with the public. Kavadarci is a positive example of a municipality in which the citizens are mostly satisfied with the work of the inspection service, because as a municipality they are the most transparent with a high percentage of 90% of active transparency[4]. In that way, this municipality also deals with corruption in the best way.

The citizens are not **informed** where they could report a certain problem related to environmental pollution (a very high percentage) in all municipalities, but on the other hand, there is evident disinterest and inertia of the citizens themselves to notice a problem (8 out of 10 respondents have so far not wanted to report a problem at all related to environmental pollution in their municipality), to get involved in the process of creating local environmental and health policies (even though they have shown indications of deteriorating health due to poor air quality) and to become more familiar with the measures that are implemented by their municipality to improve air quality. On the other hand, almost all representatives from the municipal administration in these five cities agree that the citizens are adequately consulted and informed by the municipality about the sources of air pollution and the consequences of the pollution on the health of the citizens (only the representatives from Strumica have a divided opinion). The most common answer is that the level of interest among citizens to get involved in making decisions related to environmental protection and health is at a medium or low level (half of the respondents in Strumica and Kumanovo), with the exception of Kavadarci and Struga to some extent.

When it comes to **vulnerable groups**, all interviewed representatives from the municipalities believe that the socio-economically vulnerable citizens[5] are properly consulted by the municipality in making decisions related to environmental and health protection (through

[4] Active Transparency Index, Center for Civic Communications, 2022

[5] The interviewed representatives of the municipalities of all five cities unanimously agree that when granting subsidies, priority should be given to the following vulnerable categories of citizens: single-parent families, families with many children, people with motor or sensory disabilities, people living at social risk, pregnant women or families with small children, people with low monthly incomes and pensioners.

various forums, debates, meetings, gatherings), and that subsidy measures are designed to reflect their needs. This perception cannot be seen from the responses of citizens, especially women.

All six **measures for improving air quality**, proposed in the research, are rated as a high priority in all municipalities. The opinion of the citizens differs from that of the employees in the municipal administration, but it is very similar (small differences in the percentage representation of the answers). It is worth pointing out that citizens show interest in measures related to schools (as places where their children spend a significant part of the day), as well as in the positive effect that park-forests have instead of ordinary lawns or green areas. The employees in the municipality of Kavadarci unanimously evaluated three types of measures with the highest priority (park-forest, bicycle path and improvement of energy efficiency in schools). Only in this municipality, the citizens do not prioritize themselves and their personal interest, but that of the municipality (installation of photovoltaic panels for energy production in public facilities is the measure of the highest priority for the citizens). More details on priority measures by municipality are listed in the following table.

	Kumanovo		**Gostivar**		**Struga**		**Kavadarci**		**Strumica**	
	Aggregated highest grades (4 and 5) from the citizens (C) and from the institutions (I)									
	C	I	C	I	G	I	C	I	C	I
New park-forest	73%	87%	68%	36%	74%	56%	68%	**100%**	**82%**	90%
Bicycle path	69%	90%	65%	54%	62%	47%	58%	**100%**	53%	**100%**
Installing containers for sorting domestic waste	79%	87%	78%	84%	78%	70%	64%	80%	67%	**100%**
Installing energy-efficient facades on schools	82%	93%	**81%**	80%	82%	77%	66%	**100%**	75%	83%

Replacing the old with new windows in school facilities	**83%**	94%	79%	**87%**	**83%**	84%	66%	**100%**	76%	84%
Installing photovoltaic panels for producing energy on public facilities	79%	**100%**	75%	83%	77%	**90%**	**71%**	97%	79%	97%

The three most commonly proposed measures chosen by the respondents of these five municipalities to strengthen the municipality's capacities on this topic are: increasing intersectoral cooperation, technical equipment for the inspectorate and greater financial resources.

In addition, the municipalities do not have data on the method of how small and medium-sized companies, public institutions and households are heated (except for the municipality of Kavadarci, which is a positive example in this field).

MAIN FINDINGS FROM GENDER ANALYSIS OF THE RESEARCH

Although the opinion that gender dimension is not important in terms of the influence on air pollution to people's health prevails, numerous researches that provide segregated data show the importance of taking into consideration the gender dimension. This research of the public opinion of the citizens, both men and women, about issues related to air pollution in Kavadarci, Strumica, Gostivar, Kumanovo and Struga also shows that there are differences in the experience, awareness, exposure to great risk from health consequences, but also in making decisions, including men and women in matters related to air pollution in their municipalities.

The main findings from this research that detect the gender differences refer to the following segments. Data show that to a certain extent there is a more pronounced awareness and greater concern regarding the consequences of air pollution by women. On the other hand, men show a more pronounced awareness that the existing way of heating the home affects air pollution, and consequently they show a greater willingness to change the existing way of heating their home.

Women are also more likely than men to report that they have experienced health problems due to air pollution. It is specific that in this category there are mostly women from poorer families, whose households often use energy sources that pollute the air to a greater extent in the home as well. These are families where the following energy sources are used: firewood, coal, but also waste burning. Traditional gender roles make women more exposed to indoor air pollution than men, so research data show that there are significant differences in time spent at home between men and women. Namely, women are the ones who spend most of the time in their home, on weekdays and weekends. The analysis shows that the most vulnerable category in terms of the health consequences of polluted air, precisely because of the way the home is heated, are women without personal monthly income, that is, from poorer families and women from smaller ethnic groups in these municipalities (the Roma). This indicates the need to take measures to reduce exposure to polluted air in homes among the poorest families.

Regarding the quality of home insulation, women are the ones who have more comments on the existing insulation. At the same time, they are the ones who spend more time at home than men. On the other hand, men are the ones who know more about what type of insulation they use for the walls, that is, for the roof of the home.

Although decisions about heating the home or implementing measures for energy efficiency in the home are mostly made together in the home, in situations when the decisions are brought by one family member, that member is usually the husband in all 5 municipalities.

This indicates the existence, to a certain extent, of stereotypical gender positions regarding the decision-maker in the home, that is, the positioning of the man as the head of the family, which is significantly expressed in Gostivar.

In terms of satisfaction with the work of the municipal inspection services, men are the ones who express a greater degree of dissatisfaction with their work, with the exception of Gostivar.

Although women equally know where to report a problem related to environmental pollution in the municipality, and they were also equally in a situation when they wanted to report a problem related to environmental pollution in the municipality, men still were the ones who were more often the active agent who reported this kind of problem.

Analyzed from a gender perspective, a larger percentage of women believe that they are not sufficiently consulted by the municipality in making decisions related to environmental protection and health, with the exception of Strumica and Kavadarci. This indicates the need for municipalities to approach citizens in a different way, especially female citizens, particularly in the municipality of Gostivar, where the percentage of insufficient consultation is the highest.

Regarding the priority of the mentioned measures which are considered as ecological solutions in the municipality, there is no significant difference between men and women, but for women these measures have a slightly higher priority than for men, which again indicates the higher awareness among women regarding the consequences of polluted air.

Although the main reason for not applying to the call for subsidies for energy-efficient solutions is that the citizens of these cities did not have information about the application process, it is further noted that in terms of other responses, women did not think about it to a greater extent than men, while men did not apply because they did not believe in the regularity of the process.

The additional analysis shows that the most vulnerable category, women without personal monthly income, did not apply because they had no information about this process.

All this points to the need to include the gender dimension, which will target the specific needs of women and the most vulnerable categories of citizens when it comes to protection from air pollution. The need for adequate information and adequate demonstration of the regularity of the process by the municipality is particularly emphasized.

RECOMMENDATIONS

As a result of the detailed analysis of the answers in this survey, general recommendations are given below. An individual analysis will be prepared for each municipality, in which specific recommendations will be provided.

1. **Air quality measures/actions should have a clear link to improving people's health.** Since that aspect is recognized and worries citizens the most, they will be more interested and active in the implementation of measures that favorably affect their health;
2. **Comparison of the subjective answers "what are the sources of air pollution" with the results of the Source Apportionment Studies** (when published). It is very likely that there will be differences, so it is necessary to design communication activities aimed for changing the current perception of citizens, especially changing the awareness and behavior towards construction and agricultural activities;
3. **Zero tolerance for coal, heating oil and waste burning,** with a specific plan how to change the heating method of these energy sources in households and public institutions. For this purpose, it is necessary for every municipality to follow the example of the municipality of Kavadarci and to regularly collect data on the method of heating public institutions, small and medium-sized companies and households with these energy sources;
4. **Each municipality should prepare and implement a communication plan for air quality protection** (preferably within the current Air Quality Plans), which will improve citizens' awareness and initiate positive changes in their current habits (wood heating, burning waste, stubble, wrong perception on pellets as energy source, the positive effect of wall and roof insulation, etc.);
5. **To include Civil Society as mediators in the municipality's communication with the population,** citizens have more trust in them. In cooperation with municipalities and citizens, they should identify the best ways to involve citizens in creating policies and civic monitoring for clean air. They would also most easily identify citizens with positive experiences that they would further share and promote, followed by organizing forums with citizens or meetings with vulnerable groups, in order for everyone's voice or need to be heard and included in the municipal plans for air quality;
6. **To strengthen cooperation and trust in experts** (energy controllers, experts, researchers, scientific workers, etc.). It is necessary to find a way for their greater

involvement in the design and implementation of measures for clean air, since their knowledge and experience is invaluable;

7. **To provide adequate support for households,** in order to be able to invest even with the impoverished domestic budget from the energy and price crisis. The support does not always have to be financial, it can be a free energy control, a discount provided for a new efficient heating body, etc. In addition, to ensure (perhaps again through the Civil Society) that the information about the support will reach as many citizens as possible;

8. **Restoring trust in environmental inspection services.** It is necessary to follow the example of the municipality of Kavadarci, as the best rated inspection service, or of the State Environmental Inspectorate. Once again, communication with citizens should be improved in terms of improving their knowledge where to report each violation, as well as the transparency of their work (the result of the inspection for the reported procedure should be made public). In this direction, the involvement of persons in the municipality who are responsible for communication would be of great importance for increased transparency (public and easily accessible information, simple reporting of a problem, etc.);

9. **Citizens' choices for measures for clean air.** Efforts should be made and finances should be secured to implement two measures for better air quality (at least) in each municipality, one that has the highest priority according to citizens, one according to administrative employees;

10. **Sharing experiences.** Improved cooperation among municipalities is necessary, as well as sharing good and bad practices, in order to replicate the good ones and not to repeat the bad ones. The best mechanism for this is ZELS (Association of the Units of Local Self-government);

11. **Improving the quality of air IN homes and public facilities.** The use of harmful energy sources for heating pollutes the air not only outside, but also inside. This indicates the need to take measures to reduce exposure to polluted air at home, especially among the poorest families;

12. **Whole is when there is everything.** Women from smaller ethnic communities, as well as women without personal monthly income (especially from Struga) are vulnerable categories that must be given special attention and support in the creation of Air Quality Plans at the local level, as well as their implementation.

METHODOLOGICAL REPORT

A multilevel sample of 5 individual cities was used in the research (5 urban populated places in 5 municipalities). The research was conducted with a total of 1514 respondents (300 respondents in each city), at the age of 18 or older who live in households on the territory of the urban areas of Kavadarci, Kumanovo, Gostivar, Struga and Strumica. The selection of respondents in the household is based on the principle of the first birthday that follows.
CATI phone interview was used for the purposes of the research.

Sample design

Primarily, the population in all 5 municipalities of interest is divided into 2 subgroups: ethnic Macedonians and other ethnic communities in urban settlements and ethnic Albanians in urban settlements. Rural areas in each pilot municipality were not taken into consideration.
The distribution of smaller ethnic communities (Turks, Roma, Serbs, Vlachs, etc.) in each city separately, was duly taken into consideration.
The interviews were conducted in Macedonian and Albanian.
Due to the reduced penetration of landlines in households, Tim Institut uses mobile phones up to 70%.

		Number of cases	%
	Kumanovo	301	19,9
	Gostivar	304	20,1
	Struga	303	20,0
	Kavadarci	306	20,2
	Strumica	300	19,8
	Total	1514	100,0

Sample frame:

Census 2021, published data from the State Statistics Office.

Selection of respondents

Every interviewer must have at least three attempts to contact the selected household. If even after three attempts during the work the interviewer cannot contact the household, another household is contacted according to the procedure for choosing a household.
The interviewers record the results of all contact attempts.

If it is a landline, the person whose birthday follows is interviewed in that household from all members that are present during the research.
If it is a mobile phone, the person who answers the phone is interviewed, but he/she has to be over 18 in order the necessary criteria to be satisfied.
In case the selected person refuses the interview or another household member interrupts it, the interviewer politely ends the conversation and terminates the contact.

Quality control system

30% of the conveyed interviews were subject to control.

Interviewer and supervisor's network

The research was conducted by a developed and experienced network of interviewers (telephone operators) in Macedonian and Albanian.
34 experienced interviewers worked on this project.

Duration of the research

Before the beginning of the telephone research, all interviewers received theoretical training on the methodology and work procedure, which includes an explanation of the meaning and implementation of the following procedures:

- Household selection
- Respondent selection
- Explanation of the method for completing the programme questionnaire

The research was conducted from 20.06.2023 to 12.07.2023.

The professional statistical data processing software SPSS for Windows was used to process and analyze the obtained data.
SPSS for Windows and Microsoft Office for Windows (Word and Excel) were used to prepare the report, charts and tables.

Percentage of fulfilled contacts and refusals

Number of contacts	2094
Total number of fulfilled interviews	1514

The feedback from the survey network was that acceptance and general interest among respondents was quite good.

A high degree of contact was achieved. Although the interviewers faced rejections, it was in line with the expectations, as in most public opinion surveys.
The refusals to participate in the survey mostly referred to "no time for that", while the rest were "not in the mood to answer", or "recently participated in a survey".

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Introduction **_____UNDP*0623**

1. Introduce yourself as follows: “Good morning / day / evening, my name is_____ and I work for TIM Institute, quality research and development. We are currently working on a public opinion research on the attitudes and perception of citizens about the **environment**.
2. (IF NECESSARY, PLEASE STATE): We choose the person randomly, depending on whose birthday of a person older than 18 comes next in your household. The research answers are strictly confidential according to the research standards.
3. If the randomly selected person is at home and refuses the interview or another member of the household interrupts the interview, politely say thank you and interrupt the conversation. Then, go to the following telephone number that is appropriate according to the step for choosing the following household.
4. If the randomly selected person is not at home, attempt to schedule an interview later that day or within the duration of the research. Record the date and time of the scheduled interview.

Phone number. _____

M1. __ __ __ __

M3. **Municipality:** __ __

1. Kumanovo
2. Gostivar
3. Struga
4. Kavadarci
5. Strumica

M10. **Interviewer’s code**: __ __ __ __

DEMOGRAPHY

D1. Sex (DO NOT READ)

1. Man
2. Woman

98. Refuses to answer

D2. Age _ _

D2b. Age groups

1. 18-24
2. 25-34
3. 35-44
4. 45-54
5. 55-64
6. 65+

D3. Ethnicity

1. Macedonian
2. Albanian
3. Turkish
4. Roma
5. Serbian
6. Aromanian
7. Other

D4. Education

1. Without formal education
2. Primary
3. Secondary
4. University
5. MA or PhD

D5. Employment status

1. Employed in the public sector
2. Employed in the private sector
3. Business owner
4. Part-time employee
5. Farmer
6. Housewife/Host
7. Pensioner
8. Pupil, student

9. Unemployed
10. Other

D6. Personal monthly incomes in the household

1. 11.000 denars or less
2. 11.001 - 14.000 denars
3. 14.001 - 21.000 denars
4. 21.001 – 31.000 denars
5. 31.000 – 41.000 denars
6. 41.000 - 51.000 denars
7. 51.000 - 61.000 denars
8. Over 61.000 denars
97. Without personal monthly incomes **(DO NOT READ)**
98. Refuses to answer **(DO NOT READ)**
99. Doesn't know **(DO NOT READ)**

D7. Average monthly incomes in the household

1. 11.000 denars or less
2. 11.001 - 21.000 denars
3. 21.000 - 31.000 denars
4. 31.000 – 41.000 denars
5. 41.000 - 51.000 denars
6. 51.000 - 61.000 denars
7. Over 61.000 denars
98. Refuses to answer **(DO NOT READ)**
99. Doesn't know **(DO NOT READ)**

D8. As far as your assessment is concerned, in which category does your household belong?

(ONLY ONE ANSWER)

1. Very poor, we barely make ends meet
2. Poor
3. Average, but with financial difficulties
4. Average, but without financial difficulties
5. Well-off, with favorable spending power
6. Rich
98. Refuses to answer **(DO NOT READ)**

D9. Marital status

(ONLY ONE ANSWER)

1. Married
2. Single
3. Divorced, separated
4. Widow/er
5. I live with a partner
6. Single parent
98. Refuses to answer (DO NOT READ)

D10. Do you or a member of your family receive social assistance?

1. Yes
2. No
98. Refuses to answer **(DO NOT READ)**

D11. Does your household use/used the Government measure for subsidizing electricity bills?

1. Yes
2. No
98. Refuses to answer **(DO NOT READ)**
99. I do not know (DO NOT READ)

AIR POLLUTION

Q1. Generally speaking, do you think that air pollution in your city is:

1. A very big problem
2. A big problem
3. Neither a big, nor a small problem
4. A small problem or
5. Not a problem at all
98. Refuses to answer (DO NOT READ)
99. I do not know (DO NOT READ)

Q2. How concerned are you personally about the health effects that air pollution causes or could cause?

1. Very concerned
2. Somewhat concerned
3. Neither concerned, nor unconcerned
4. Somewhat unconcerned
5. Not concerned at all
98. Refuses to answer (DO NOT READ)
99. I do not know (DO NOT READ)

Q3. Have you felt certain health problems due to air pollution?

1. Yes, **Q3a** What kind of _____
2. No
99. I do not know, refuses to answer (DO NOT READ)

Q4. Has any other family member felt any health problem due to air pollution?

1. Yes **Q4a Who is that other family member _____ Q4b**
What kind of problems _____
2. No
99. I do not know, refuses to answer (DO NOT READ)

Q5ab. In your opinion, what do you think contributes the most to air pollution in your city? (ONLY ONE ANSWER)

	Q5a First answer	**Q5b** Second answer
Industry	1	1
Transport	2	2
Construction	3	3
Household heating	4	4
Public facilities heating (schools, hospitals)	5	5
Waste (burning waste in illegal landfills)	6	6
Agriculture (agricultural crops and stubble burning)	7	7
Other, write down	8	8

HEATING

Q6. In your opinion, on a scale from 1 to 5 (where 1 is not at all and 5 is very much), to what extent each of the stated energy sources that could be used for household heating affect air pollution in the city?

		Not at all				Very much	DK/Refuses
Q6_1	Firewood	1	2	3	4	5	99
Q6_2	Coal	1	2	3	4	5	99
Q6_3	Heating Oil	1	2	3	4	5	99
Q6_4	Pellets	1	2	3	4	5	99
Q6_5	Various waste materials (varnished wood, plastic, etc.)	1	2	3	4	5	99

Q7. Are there citizens in your surroundings who use waste for heating, for example: plastic bottles, reused oil, varnished wood, parquet and windows etc.?

1. Yes
2. No
9. Do not know **(DO NOT READ)**

Q8-9. What do you (primarily and additionally) use for heating your home?
(ONE ANSWER IN EACH ROW)

	Q8 Primarily	**Q9** Additionally
Coal	1	1
Firewood	2	2
Pellets	3	3
Briquettes	4	4
Extra light (oil)	5	5
Liquefied petroleum gas (LPG)	6	6
Electricity – air conditioner	7	7
Electricity – fan heater, electric quartz heater or panel heater	8	8
Central heating system	9	9

Waste with energy value	10	10
Other, write down	11	11
I do not use additional energy source		98
I do not know **(DO NOT READ)**	99	99

Q10-11. How many hours a day do you heat your home?
(ONE ANSWER IN EACH ROW)

	Q10 **During weekdays**	**Q11** **During weekends**
Up to 4 hours a day	1	1
From 5 to 8 hours a day	2	2
From 9 to 12 hours a day	3	3
From 13 to 16 hours a day	4	4
More than 16 hours a day	5	5
I do not know	99	99

Q12-13. How many hours a day do you spend in your home?
(ONE ANSWER IN EACH ROW)

	Q12 **During weekdays**	**Q13** **During weekends**
Up to 8 hours a day	1	1
From 8 to 16 hours a day	2	2
More than 16 hours a day	3	3
All the time	4	4
I do not know	99	99

Q14. Do you think that the way you heat your home contributes to air pollution in the surrounding area where you live?

1. Yes
2. Somewhat yes
4. Somewhat no
5. No
98. Refuses to answer (DO NOT READ)
99. I do not know (DO NOT READ)

READINESS FOR INVESTING

Q15. If you were to change the way you currently heat your home, who would you trust most when it comes to recommendations for an efficient solution for saving energy?
(ONLY ONE ANSWER)

1. Relatives, friends, neighbors
2. Professors, experts
3. The Municipality
4. Recommendations from satisfied citizens (the internet, posts, advertisements)
5. No one
6. Other, write down
99. I do not know **(DO NOT READ)**

Q16. Do you want to change the current way of heating your home?

1. Yes, **Q16a.** Why, write down----------
2. No, **Q16b.** Why, write down----------
99. I do not know **(DO NOT READ)**

Q17. If you could choose, regardless of the price for installing the equipment and the monthly expense, which heating method would you choose for your home?
(SPONTANEOUS ANSWER, do not read the answers)

1. Pellet boiler
2. Gas boiler
3. Electric quartz heater
4. Inverter air conditioner
5. Heat pump
6. Central heating
7. Wood stove/Fireplace
8. I would not change the existing method of heating (GO TO **Q19)**
9. Other, what_____
98. Refuses to answer
99. I do not know

Q18-20. If you could make three investments in your home to save more energy, what would those three investments be in your opinion?

(ONE ASNWER IN EACH ROW)

		Q18 First investment	Q19 Second investment	Q20 Third investment
1	Installing solar systems	1	1	1
2	Changing the heating device	2	2	2
3	Wall insulation (internal insulation)	3	3	3
4	Roof insulation	4	4	4
5	Replacement of windows	5	5	5
6	Facade – external insulation	6	6	6
7	New radiators/Installing radiators	7	7	7
8	Other	8	8	8
99	I would not make any investment	99	99	99

Q21. How likely is it that you would decide to make any of the previously mentioned investments in the following 12 months?

1. Very likely
2. Likely
3. Neither likely, nor unlikely
4. Unlikely or
5. Very unlikely
9. I do not know (DO NOT READ)
99. Refuses to answer (DO NOT READ)

Q22. Would you say that the home where you live has:

1. Excellent insulation
2. Good insulation
3. Average insulation
4. Bad insulation
5. Very bad insulation or
6. It does not have insulation at all
9. I do not know (DO NOT READ)
99. Refuses to answer (DO NOT READ)

Q23-24. What type of wall and roof insulation do you have in your home?
(ONE ANSWER IN EACH ROW)

	Q23 **walls**	Q24 **roof**
Styrofoam	1	1
Mineral wool	2	2
Combined	3	3
Other, write down	4	4
No insulation	5	5
I do not know	99	99

Q25. What type of windows do you have in your home?

1. Wooden
2. PVC
3. Aluminium
4. Combination
5. Other, what_____
9. I do not know (DO NOT READ)

Q26. Who in your family makes the decisions related to implementing the measures for energy efficiency in your home?

1. Me personally
2. The parents
3. The husband
4. The wife
5. Male partner
6. Female partner
7. Together
8. Other members of the household
9. Other, write down

INSPECTION SERVICES AND POLICIES

		Dissatisfactory	2	3	4	Excellent	I do not know
Q27_1	How would you evaluate the work of the inspection service within the municipality in terms of dealing with environmental problems?	1	2	3	4	5	99
Q27_2	How would you evaluate the work of the inspection service within the municipality in terms of transparency?	1	2	3	4	5	99
Q27_3	How would you evaluate the work of the inspection service within the municipality in terms of corruption?	1	2	3	4	5	99

		YES	NO	I do not know
Q28_1	Do you know where to report a specific problem related to environmental pollution in your municipality?	1	2	99
Q28_2	Have you ever wanted to report a problem related to environmental pollution in your municipality?	1	2	99
Q28_3	Have you ever reported a problem related to environmental pollution in your municipality?	1	2	99

If YES to Q28_3 GO TO Q29

If NO to Q28_3 GO TO Q30

Q29. Are you satisfied with the way the Inspectorate/Municipality acted on the report?

1. Yes,
2. No
99. I do not know/Refuses to answer

Q30. Generally speaking, do you think the inspection service within the municipality works in favor of the citizens and protects their interests?

1. Not at all
2. Generally no
3. Neither yes, nor no
4. Generally yes

5. Completely
99. I do not know/NA

Q31. Do you think you are consulted enough by the municipality when making decisions related to protecting the environment and health (through various forums, debates, meetings, gatherings…)?

1. Not at all
2. Generally no
3. Neither yes, nor no
4. Generally yes
5. Completely
99. I do not know/NA

Q32. Do you know what measures the municipality implements to improve air quality?

1. Yes
2. No

Q33. What priority do you think should be the implementation of the following measures in your city?

		A very small priority				The biggest priority	Do not know
Q33_1	The creation of a new forest park	1	2	3	4	5	9
Q33_2	The creation of a bicycle path	1	2	3	4	5	9
Q33_3	Installation of containers for sorting domestic waste	1	2	3	4	5	9
Q33_4	Installation of energy-efficient facades of schools	1	2	3	4	5	9
Q33_5	Replacement of old windows with new ones in school facilities	1	2	3	4	5	9
Q33_6	Installation of photovoltaics for energy production in public facilities	1	2	3	4	5	9

Q34. In your opinion, is there any public facility in the city (hospital, school, kindergarten, municipal building) that should urgently have a new energy-efficient façade, should have the windows changed or should have modifications in the way the facility is heated…?

1. Yes, **Q34a**. Write down the facility_____
2. No
99. Do not know

SUBSIDIES

Q35. Is there a subsidized programme for energy efficiency in your municipality, which is help for households? If YES, what for:
(POSSIBLE MULTIPLE ANSWERS)

1. Facade measures
2. Windows and doors measures
3. Inverter air conditioners
4. Pellet stoves
5. No
6. Other, write down
99. I am not informed

Q36. Have you applied to a call for subsidies for energy efficient solutions?

1. Yes
2. No

Q37. If YES, in which institution have you applied?

1. The Municipality
2. The Ministry of Economy
3. Other_____
9. Refuses to answer

Q38. If NO, why haven't you applied?

_____

96. I was not informed
97. I do not believe in the regularity of the process
98. I have not thought about that
99. I have no need