



LIFE 15 IPF IT 013

With the contribution
of the LIFE Programme
of the European Union



Citizen and Air Quality

*Second edition of the survey on citizen perception –
Executive summary*





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of the European Union



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The Survey realised by ART-ER was implemented in collaboration with other competencies within the project consortium

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IL PROGETTO PREPAIR	Errore. Il segnalibro non è definito.
DURATA	Errore. Il segnalibro non è definito.
BUDGET COMPLESSIVO	Errore. Il segnalibro non è definito.
FONDI COMPLEMENTARI	Errore. Il segnalibro non è definito.
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Project PrepAIR and LIFE Programme

The survey was carried out within the framework of the Life15 IPE IT 013 PREPAIR (Po Regions Engaged to Policies of Air) Project, which involves 18 Italian and international partners and includes all the regions of the Po Basin. The project aims to implement, on a larger scale, the measures envisaged by the regional air quality plans and the Basin Agreement and to strengthen the sustainability and durability of the results. The project concerns the Po Valley, the regions and cities with the greatest influence on air quality in the basin.

More than 25 million people live in the regions of the Po Valley basin (over 40% of the Italian population) and more than 50% of Italy's GDP is produced here. Atmospheric emissions in this basin are therefore significant. However, they are lower than the European Union average and in line with those of the most advanced countries, when compared to GDP or number of inhabitants. This is a sign that technological standards and management practices are among the most advanced. Despite this, the orographic conformation and the particular meteorological and climatic conditions of the basin make the dispersion of pollutants particularly difficult, with values of dust, nitrogen oxides and ozone exceeding thresholds.

Air pollution in this area of Italy goes beyond local borders and requires a supra-regional approach. It is necessary to introduce integrated and coordinated measures over a wide area to reduce emissions and thus achieve a decrease in pollutant concentrations in the atmosphere. The aim of the European PREPAIR project is to promote sustainable lifestyles, production and consumption, which can help reduce emissions. In order to do this, specific awareness-raising actions are planned for public, private and local communities of which this survey is part, carried out by ART-ER Attractiveness Research and Territory as the partner responsible for the project communication actions.

INTRODUCTION

In terms of the limit values set by the European Union, the Po River basin is a critical area for the air quality of particulate matter, nitrogen oxides and ozone. This area covers the northern Italian regions and includes some large urban agglomerations such as Milan, Bologna and Turin. The Po area is densely populated and highly industrialised. Tonnes of nitrogen oxides, dust and ammonia are released into the atmosphere every year, as well as many other pollutants mainly related to traffic, domestic heating, industry, energy production and intensive agriculture including livestock farming.

How do the citizens of the Po basin perceive this problem? Are they aware that many actions to improve air quality are closely linked to their lifestyle? How willing are they to change their habits? And above all, how can local authorities convince them to change these habits?

These issues were addressed by a survey conducted between November 2018 and January 2019 as part of the PREPAIR project. The results of the survey were presented in the first report entitled 'CITIZENS AND AIR QUALITY. The results of the first survey conducted in the Po river basin in northern Italy'.

The same survey was then replicated between January and March 2023 to assess changes in the perception of air quality and air pollution by citizens in the Po basin. The survey thus investigates the level of citizens' perception and awareness of air quality and, in particular, of the main sources of air pollution. Among other things, this study makes it possible to compare and contrast the perceptions of citizens in the Po basin with those in parts of Italy or Europe.

The methodology used for the survey is multi-channel "social" to reach a representative audience of respondents. A communication campaign invited citizens to share the purpose of the survey with their networks of friends, arousing great interest throughout the Po basin area. A total of 7,030 citizens voluntarily filled in the questionnaire, guaranteeing a representativeness of 38% with respect to the total number of municipalities that make up this area and 78% of the resident population (4,188 municipalities, with a population of 25.1 million people).

Results

An extensive and complex research can be difficult to interpret, therefore, to facilitate understanding, we grouped the results into "facts" through which the results can be interpreted.

Fact 1 - Perception

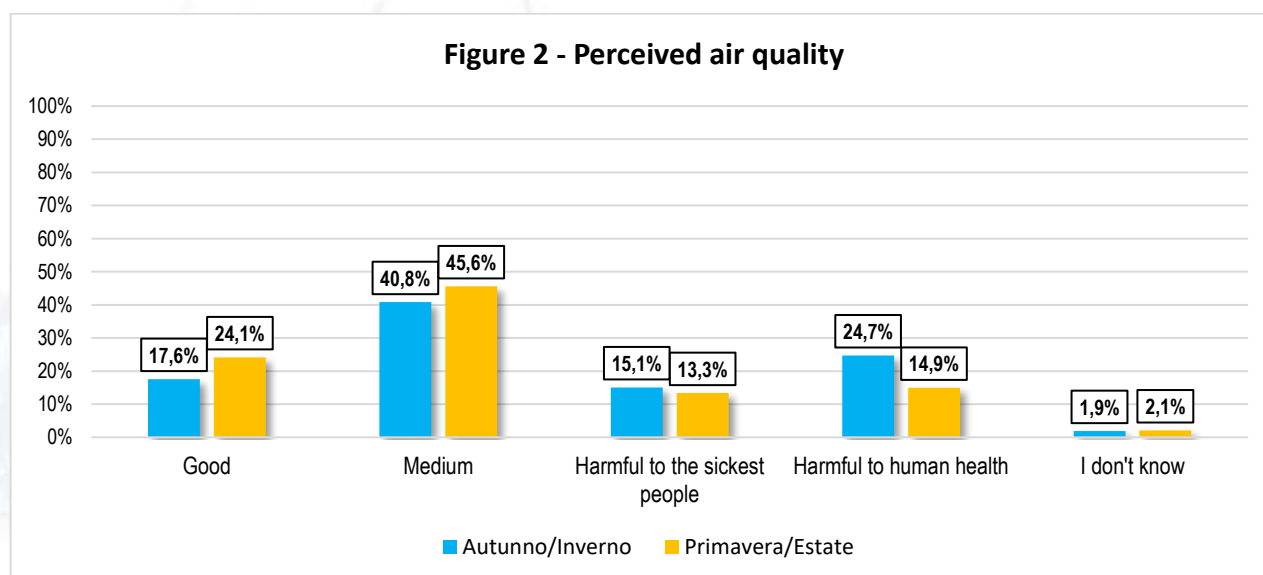
Respondents were asked to rate perceived air quality at different times of the year (fall/winter and summer/spring) and the perceived trend (i.e., change) in air quality over the past 10 years.

In relation to perceived air quality (Figure 2), respondents were asked to make judgments regarding the coldest seasons of the year and the warmest seasons.

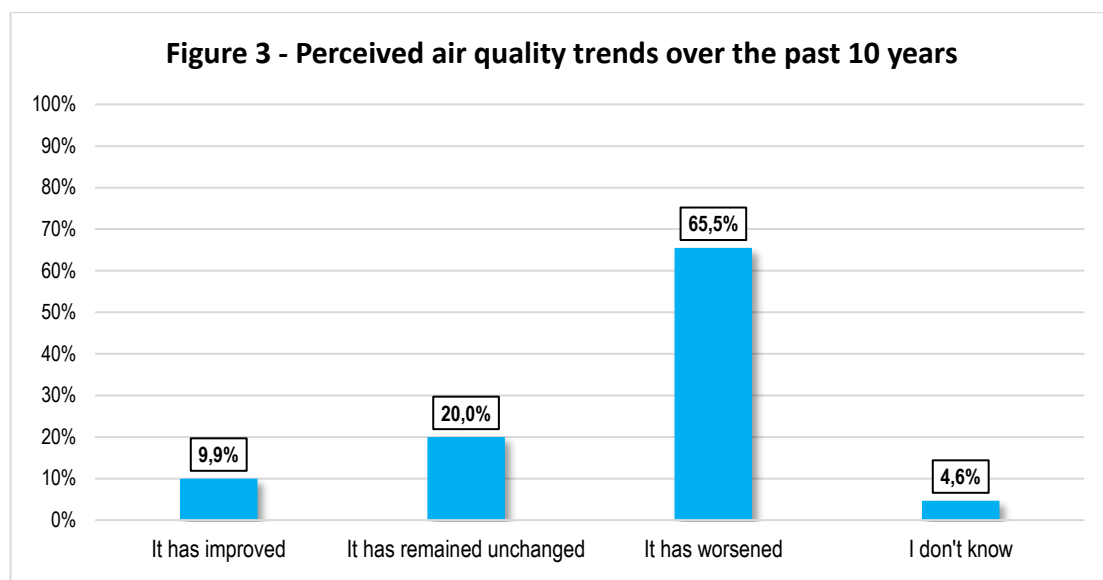
In the colder seasons (fall/winter), air quality is considered harmful by 39.8 percent of respondents ("harmful to the sickest people" and "harmful to human health"). In contrast, air quality in cold seasons is considered poor by as many as 40.8 percent of respondents, while only 17.6 percent consider it "good."

In warm seasons (summer/spring), the percentage of respondents who rate air quality as "good" rises to 24.1%, while the slice of respondents for whom air quality is harmful falls to 28.2%. 45.6% consider the air quality to be mediocre.

These results substantially confirm the previous survey, considering cold seasons as those generally associated with higher air pollution.



Regarding respondents' perceptions of the trend (i.e., change) in air quality over the past 10 years (Figure 3), the vast majority of the sample (65.5%), air quality has worsened over the past ten years, while for only 9.9% of respondents this has improved. Finally, 20% believe that the quality has remained unchanged. Compared with the previous survey, the clear perception of a worsening trend in atmospheric quality is thus confirmed. Interestingly, however, both the perception of improvement (6.3% in the previous survey) and the perception of worsening (63.3% in the previous survey) appear to be increasing compared to the previous survey.

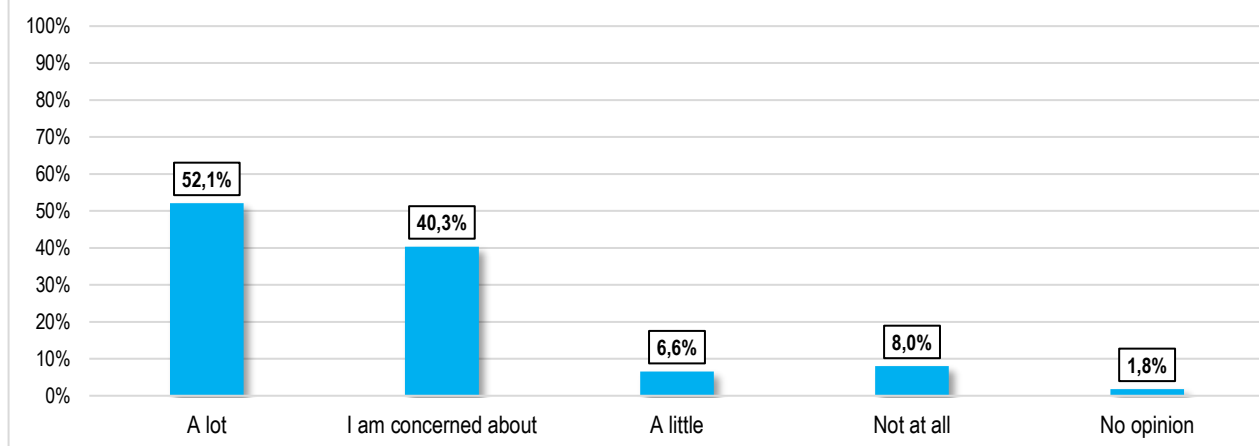


Fact 2 - Concern and Awareness

In addition, the results of the survey were examined in relation to the issue of respondents' concern about worsening air quality and air pollution, and their own awareness in relation to this specific environmental issue.

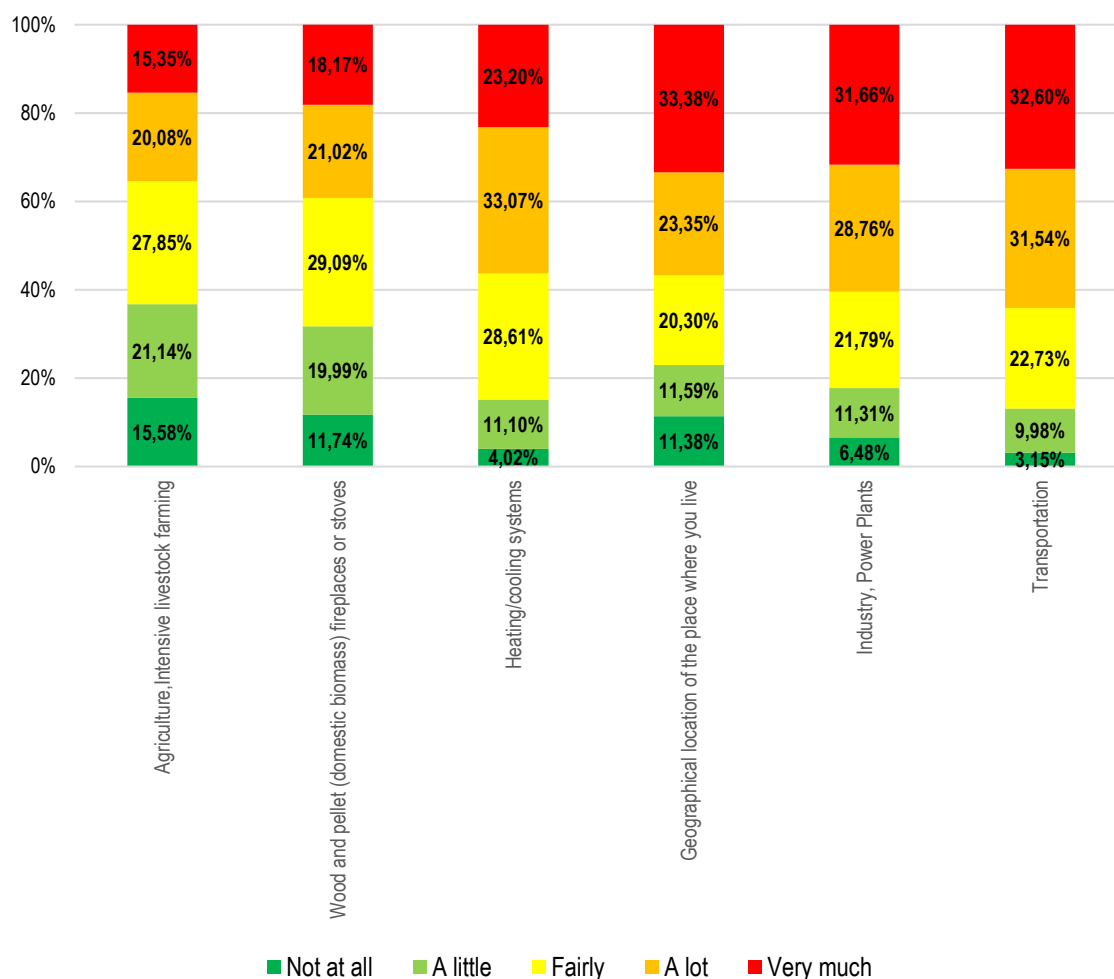
First, survey participants were asked about their concern regarding the levels of air pollution they are exposed to (Figure 4). Almost all of the sample say they are concerned about their exposure to air pollution: of these, as many as 52.1% of the sample say they are very concerned. Only 14.6% of participants say they are little or not at all concerned.

Figure 4 - Concern about the levels of air pollution to which one is exposed



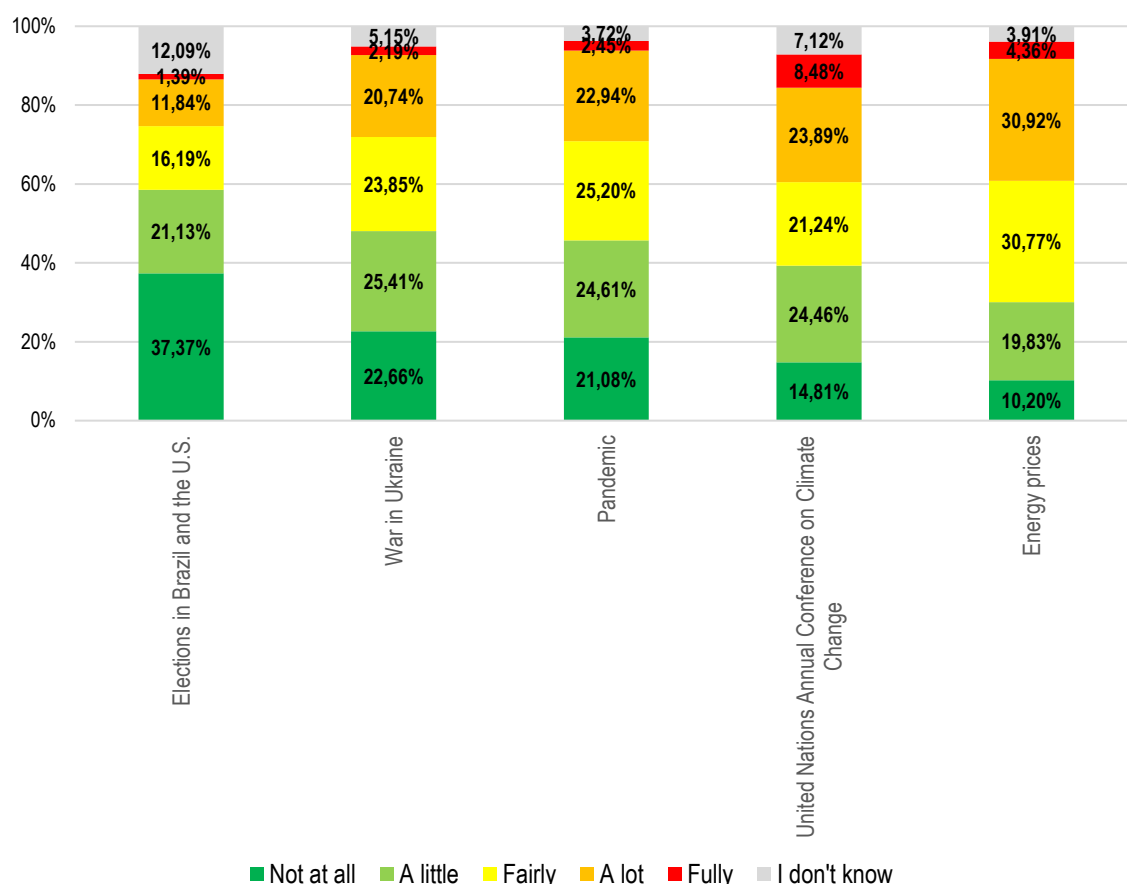
Next, respondents were asked to indicate what they thought were the main causes of air pollution among the different options shown in Figure 5. Transportation emerges as the most responsible cause of air pollution according to respondents. Specifically, this cause is believed to be "a lot " and "very much" responsible for pollution by 32.6% and 31.54% of respondents, respectively. This result confirms the outcomes of the previous survey, in which transportation was cited as the main cause of pollution by 59.8% of respondents. Next, we find industry and power plants, considered "very much" and "a lot" relevant by 31.66% and 28.76% of respondents, respectively. In the previous survey, industry appeared third in the ranking of causes considered most relevant. Therefore, the current survey reports a slight increase in the perceived relevance of industrial pollution. In third position, we find the geographical location of the respondent's place of residence, indicated as "a lot" or "very much" relevant by 56.7% of respondents. Compared with the previous survey (in which this item was "a lot" or "very much" relevant for 45.8% of the sample) there is evidence of an increase in the perceived relevance of one's place of residence to air pollution. Heating/cooling systems come in fourth place, showing no change from the previous survey. In the last two positions, we find fireplaces or wood and pellet stoves (39.19%), and agriculture and intensive livestock farming (35.43%). This last item, similarly to the previous survey, is confirmed in last place in the "ranking" of causes.

Figure 5 - Causes of pollution in one's area of residence



The survey also questioned respondents about the possible impact on air quality of certain events that have affected international scenarios (Figure 6). Not surprisingly, the price of energy is seen as a factor with a decisive impact on air quality: 35.3% of respondents in fact believe that this factor has a "a lot" or "fully" relevant impact. In second position, the Conference of the Parties (COP) of the UNFCCC is considered to have a "a lot" or "fully" relevant impact for 32.4 percent of respondents. Finally, the pandemic, the war in Ukraine, and the election of the presidents of Brazil and the U.S. are believed to have a degree of relevant impact on air quality by only 25.4 percent, 22.9 percent, and 13.2 percent of respondents, respectively.

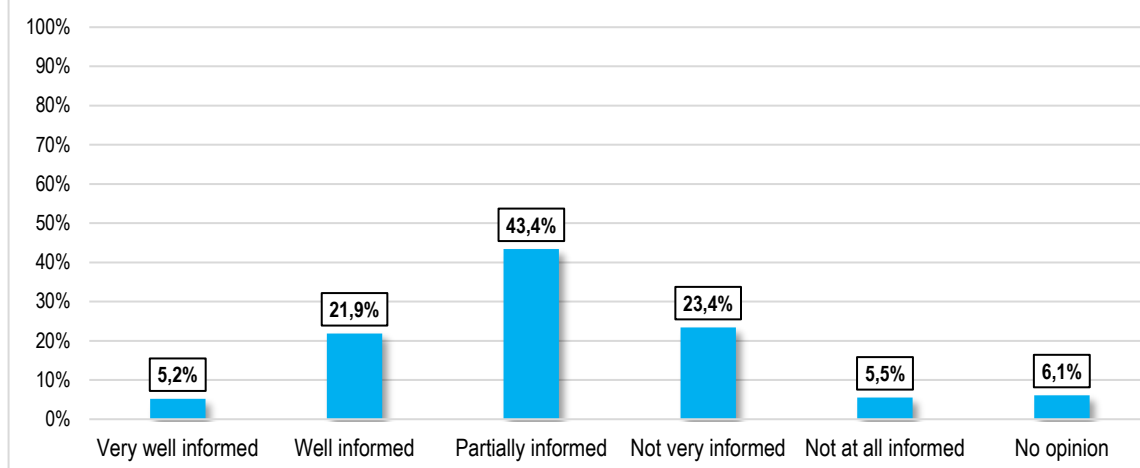
Figure 6 - Degree of perceived impact of the following events on air quality



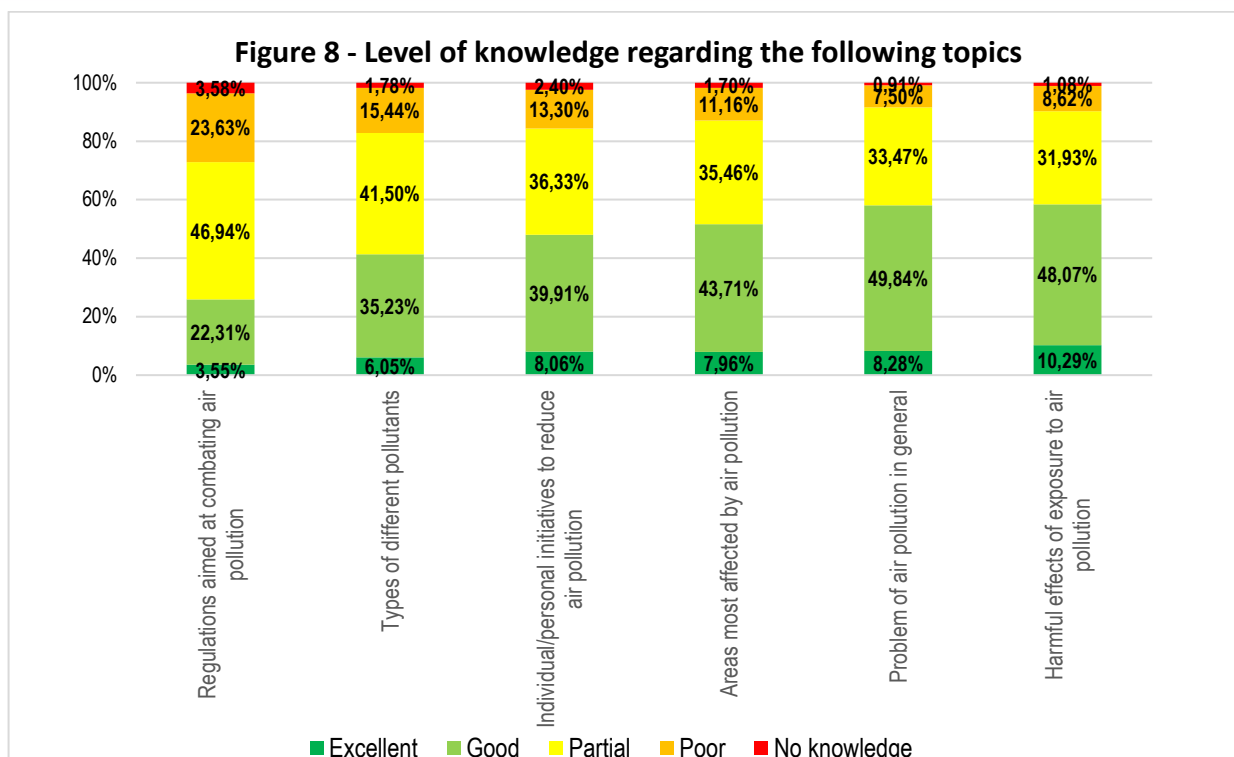
Fact 3 - Information and Knowledge about Air Quality

Related to information and knowledge about air quality and air pollution, the questionnaire asked participants to self-assess the level of information about air quality in their geographical context (country, region, or city) (Figure 7). The percentage of respondents who self-rated themselves as "very well informed" or "well informed" stands at 27.1 percent of the sample (5.2 percent and 21.9 percent, respectively), while 28.9% of respondents considered themselves "not very informed" or "not at all informed." The largest portion of respondents, i.e. 43.4%, thus falls into the intermediate category of "partially informed."

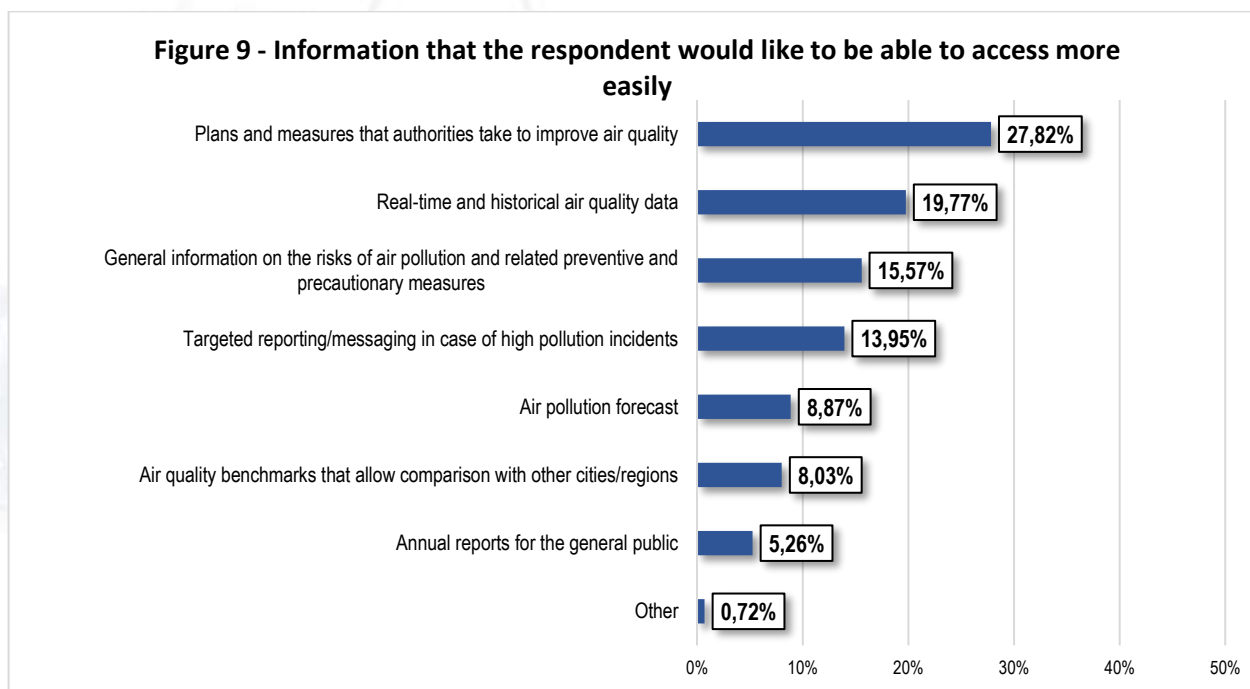
Figure 7 - Level of information about air quality in your country/region/city



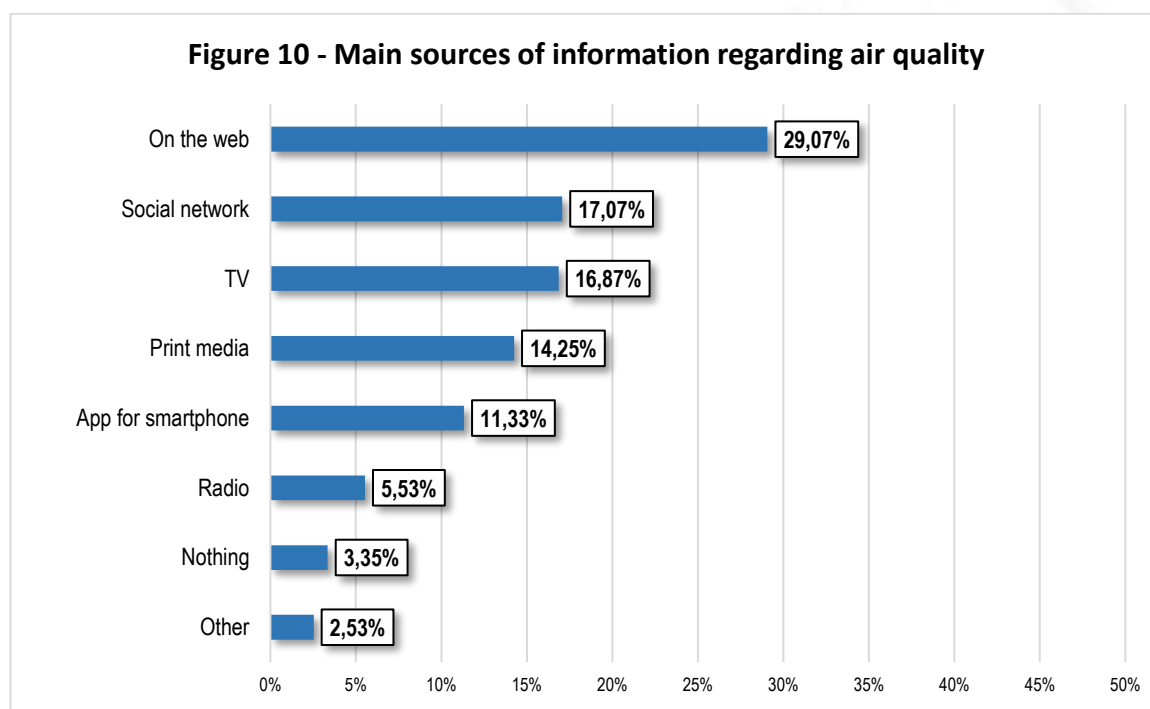
The survey delved further into the topic of knowledge and information, investigating the level of knowledge regarding some specific air quality issues (Figure 8). The topic that finds the highest level of knowledge is that of the harmful effects of air pollution: as many as 58.36% of the sample declares good or excellent knowledge about this topic, while only 9.7% say they have no knowledge about it or only poor knowledge. Following this, 57.12% of the sample declares good or excellent knowledge of the topic, while only 8.4% declare no knowledge or only poor knowledge. In third place in terms of level of knowledge is the topic of areas most affected by air pollution: 51.67% say they have excellent or good knowledge on this topic, while the remaining 48.32% state partial, poor or no knowledge. Fewer than half of the sample (47.97 percent) say they are aware of individual initiatives useful in reducing air pollution; 15.7 percent say they have no or only little knowledge in this regard. Finally, specific issues for which a lower level of knowledge emerges among survey participants include the types of pollutants and regulations aimed at combating air pollution.



In terms of information that respondents would like to be able to access more easily (Figure 9), in first place are plans and measures that authorities take to improve air quality with 27.82% of citizens selecting this option. 19.77% of respondents want easier access to real-time and historical data on air quality. In third place is information regarding risks on air pollution and related preventive and precautionary measures (15.57%). The type of information least selected by citizens is annual reports for the general public, with 5.26% of respondents expressing this preference.



Regarding sources for receiving information on air quality (Figure 10) we see that the most important tool is the web, chosen by about 29% of respondents, confirming, even compared to the previous survey, the most used source. At some distance follow social networks (17.07%) and traditional media such as television (chosen by 16.87% of cases) and print media (14.25%). Compared with the previous survey, there is a significant change with regard to social networks in particular. In fact, while the latter were in fourth position in the last survey, we now find them in second. On the other hand, traditional media (TV and print media) move from second and third place in the previous survey to third and fourth in the present one. Not too far behind is the percentage of respondents who say they inform themselves via smartphone apps (11.33%). This information source shows an increase from the previous survey, moving from last to penultimate position, thanks to a percentage increase of about 3 points (from 8% to 11.3%). Radio appears to be the least used information tool (5.53% of cases), registering a percentage decrease of about 5 points (in the previous survey it stood at 10.2%). Finally, 3.35 percent of respondents say they do not inform themselves through any of the above information media, while 2.53 percent say they use other forms of information.

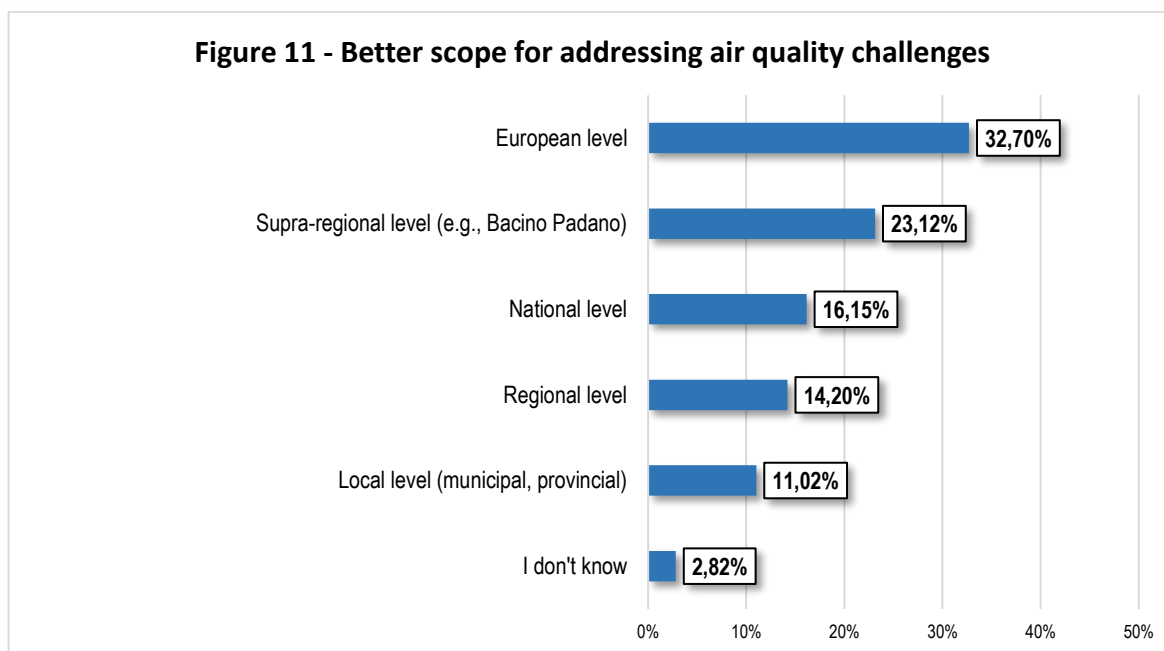


Fact 4 - Policies and Initiatives

Two questions in the questionnaire address the scope considered best to address the challenges posed by the air quality issue and the initiatives considered most effective.

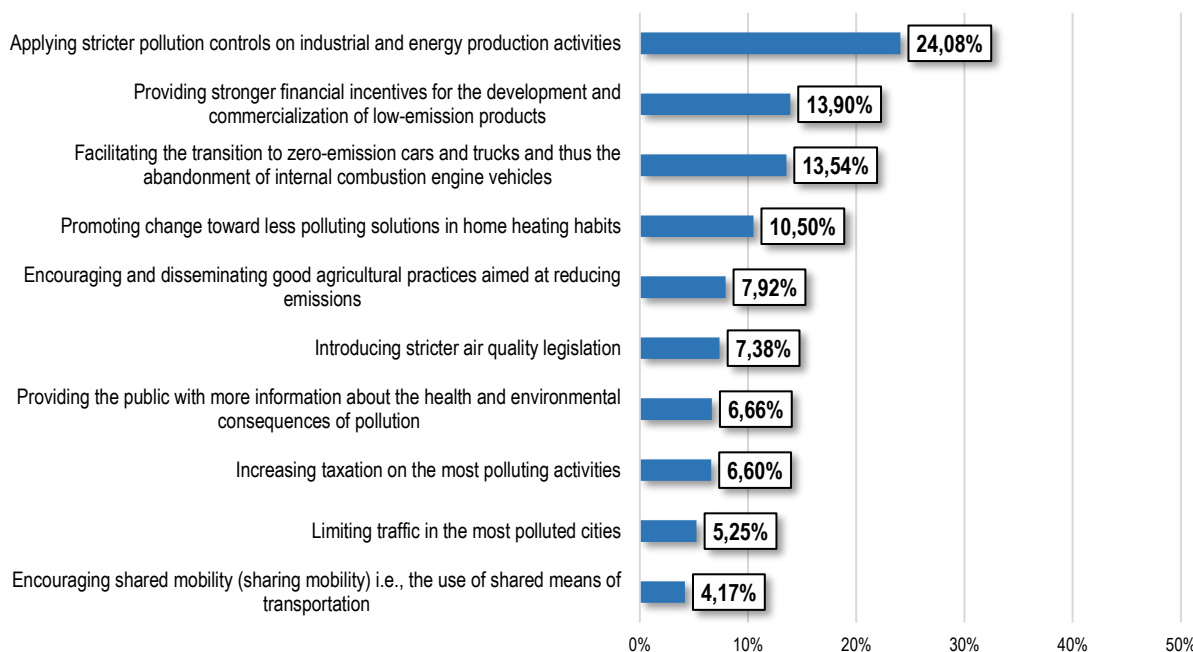
In terms of scope (Figure 11), most respondents (32.07%) consider the European level to be best, followed by the supra-regional level (23.12%). These two data confirm the findings of the previous survey. The local scope (i.e., municipal and provincial), on the other hand, is considered the least significant in addressing air quality challenges, with only 11% of respondents choosing this option. This figure is not in line with the previous survey, as the local level was the third best level for addressing air quality challenges, after the European and supra-regional levels.

Figure 11 - Better scope for addressing air quality challenges



As for the initiatives considered most effective in addressing air quality problems (Figure 12), in first place are industrial pollution controls, selected by 24% of respondents, followed at a distance of about 10 percentage points by the provision of financial incentives for the development and commercialization of low-emission products (13.9%) and measures to facilitate the transition to zero-emission cars and trucks (13.54%). The first two positions are covered by the same initiatives as in the previous survey. Instead, the initiative related to facilitating the transition to low-emission means of transportation was not present in the previous survey and, therefore, a comparison cannot be made. In the last places we find four initiatives, the last two of which directly affect citizens, and perhaps for this reason they were selected by a smaller share of respondents. Specifically, these two initiatives refer to limiting traffic in the most polluted cities and encouraging shared mobility (sharing mobility), with 5.25% and 4.17% of respondents choosing these options, respectively. While the latter response option was not present in the previous questionnaire and, therefore, cannot be compared, traffic restrictions, on the other hand, ranked last, confirming the low importance citizens attach to this initiative in addressing air pollution problems.

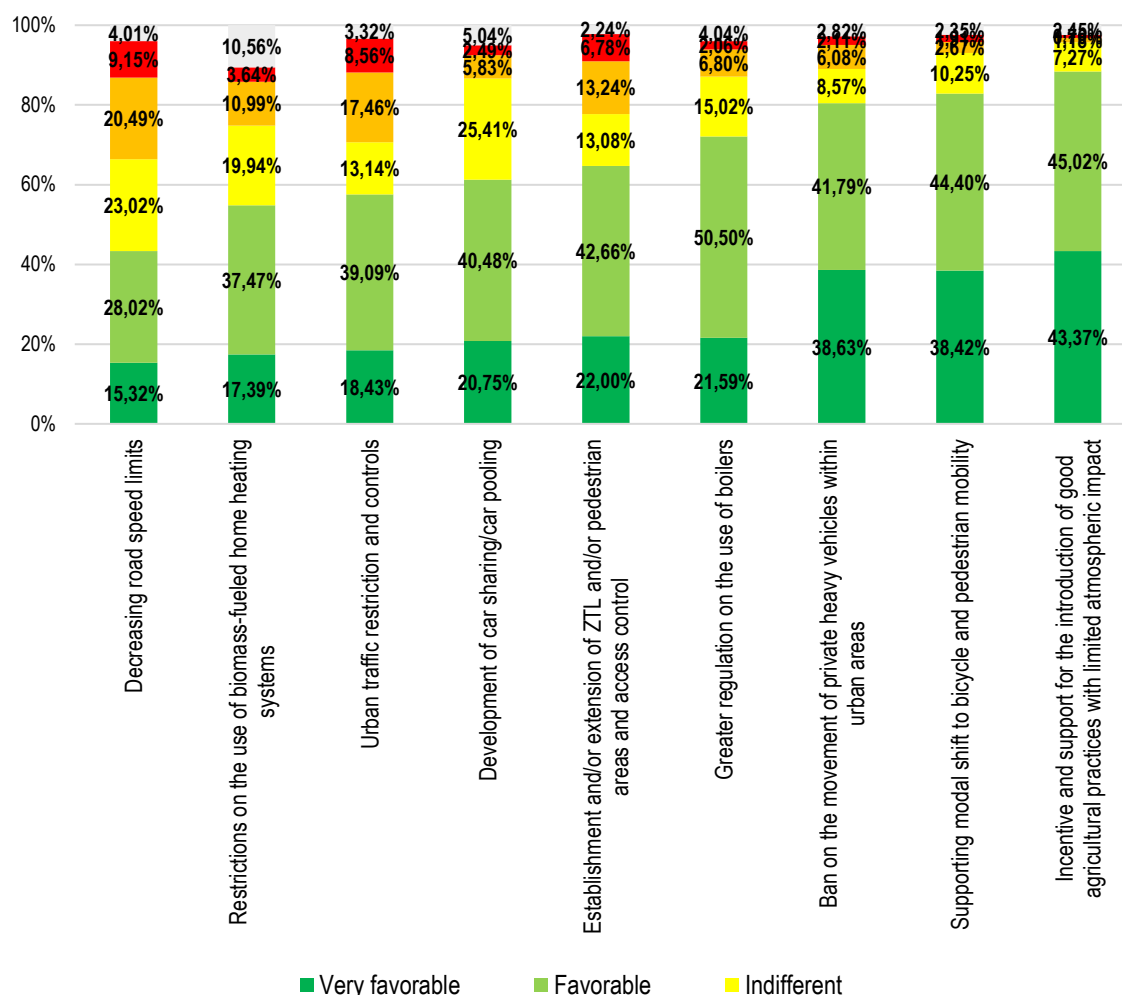
Figure 12 - Initiatives deemed most effective in relation to air quality



Three other questions in the questionnaire deal with opinions on certain initiatives aimed at combating air pollution, on the commitment of certain actors in fostering good air quality, and on the initiatives deemed most effective, given the areas in which the PREPAIR project acts.

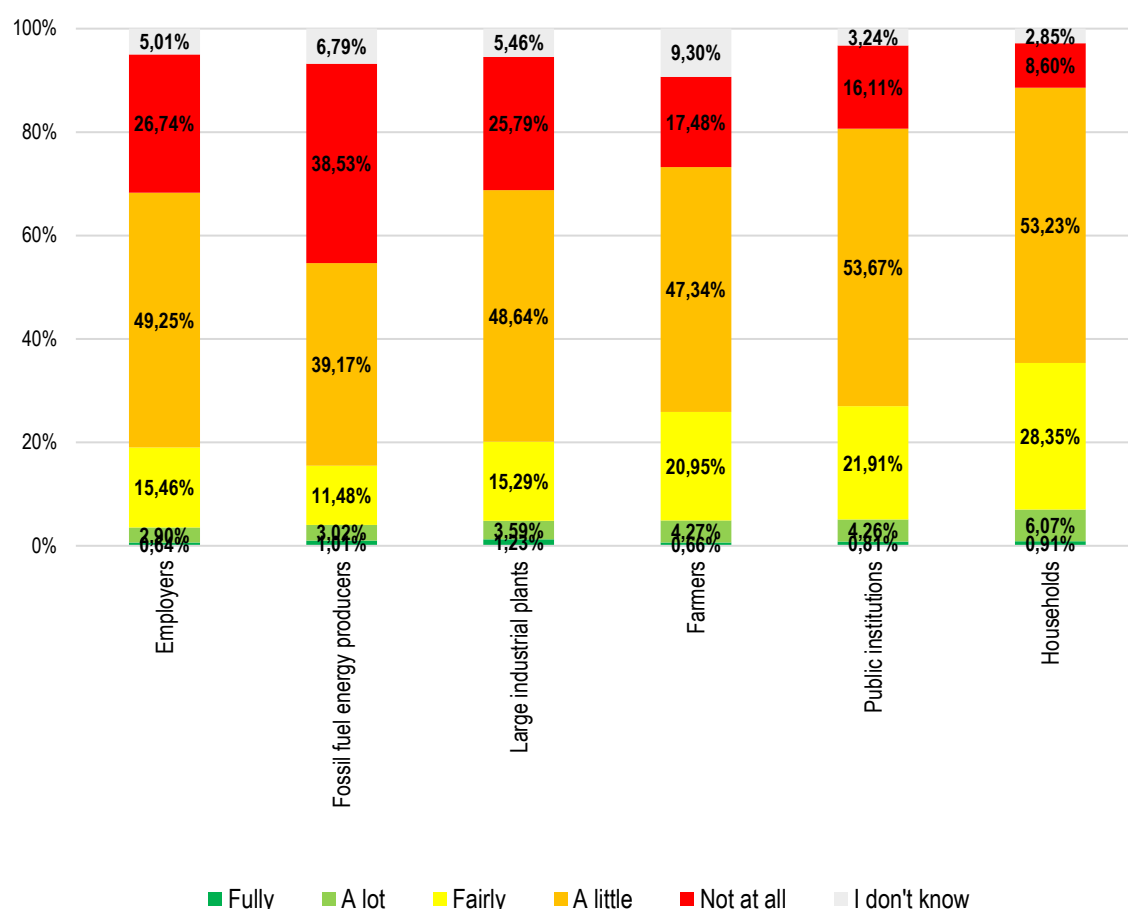
In terms of initiatives (Figure 13), respondents are most supportive of those involving incentives and supports for the introduction of good agricultural practices with limited atmospheric impact (initiative added in this questionnaire compared to the previous one). This result is surprising, since when respondents were asked to rate the most effective initiatives to address air pollution, only 7.92% chose the option related to the introduction and dissemination of good agricultural practices in order to reduce emissions. Respondents also favor initiatives to support modal shift toward bicycle-pedestrian mobility and electric scooter sharing. This finding is in line with the previous survey. This result is also peculiar in that, as in the case of good agricultural practices, only 4.17% of respondents to the questionnaire found incentives for mobility sharing to be effective. In absolute terms, however, it should be noted that respondents are quite supportive of all initiatives. The initiative viewed least favorably by citizens appears to be the decrease in road speed limits, confirming, as in the previous survey, in last place.

Figure 13 - Opinion regarding initiatives to address air pollution



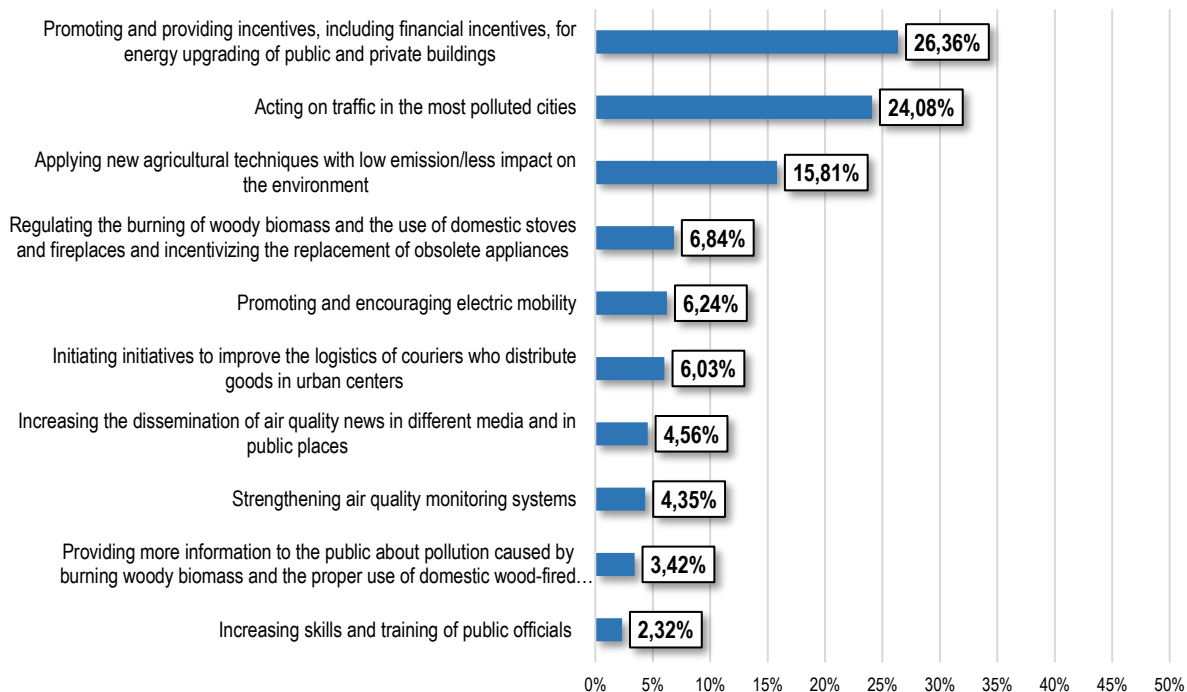
Regarding the commitment of certain actors in fostering good air quality (Figure 14), the response options were Employers, Fossil Fuel Energy Producers, Large Industrial Plants, Farmers, Public Institutions, and Households. In general, there is a perception by citizens that there is little commitment on the part of these actors to fostering good air quality. Citizens' perceptions thus appear quite critical.

Figure 14 - Commitment of the following actors in promoting good air quality



Finally, with regard to the initiatives considered effective within the PREPAIR project (Figure 15), in first place we find promotion and incentive actions for the energy upgrading of public and private buildings, with 26.36% of respondents selecting this option. In second place, with a similar percentage (24.08%), we find actions on traffic in the most polluted cities. Compared with the previous survey, there is a reversal of the top two positions, since traffic restriction emerged as the initiative considered most effective, followed by building energy upgrading. In third place, with a gap of about 8 percentage points from actions on traffic, is the application of new low-emission agricultural techniques (15.81%) (which, instead ranked fourth in the previous survey). The other initiatives developed under the PREPAIR project are well below the above percentages. In the last two places we find initiatives concerning the dissemination of information regarding pollution caused by wood biomass burning and the proper use of wood-fired systems (3.42%) and improving the skills and training of public officials (2.32%). The last two positions are in line with the results of the previous survey.

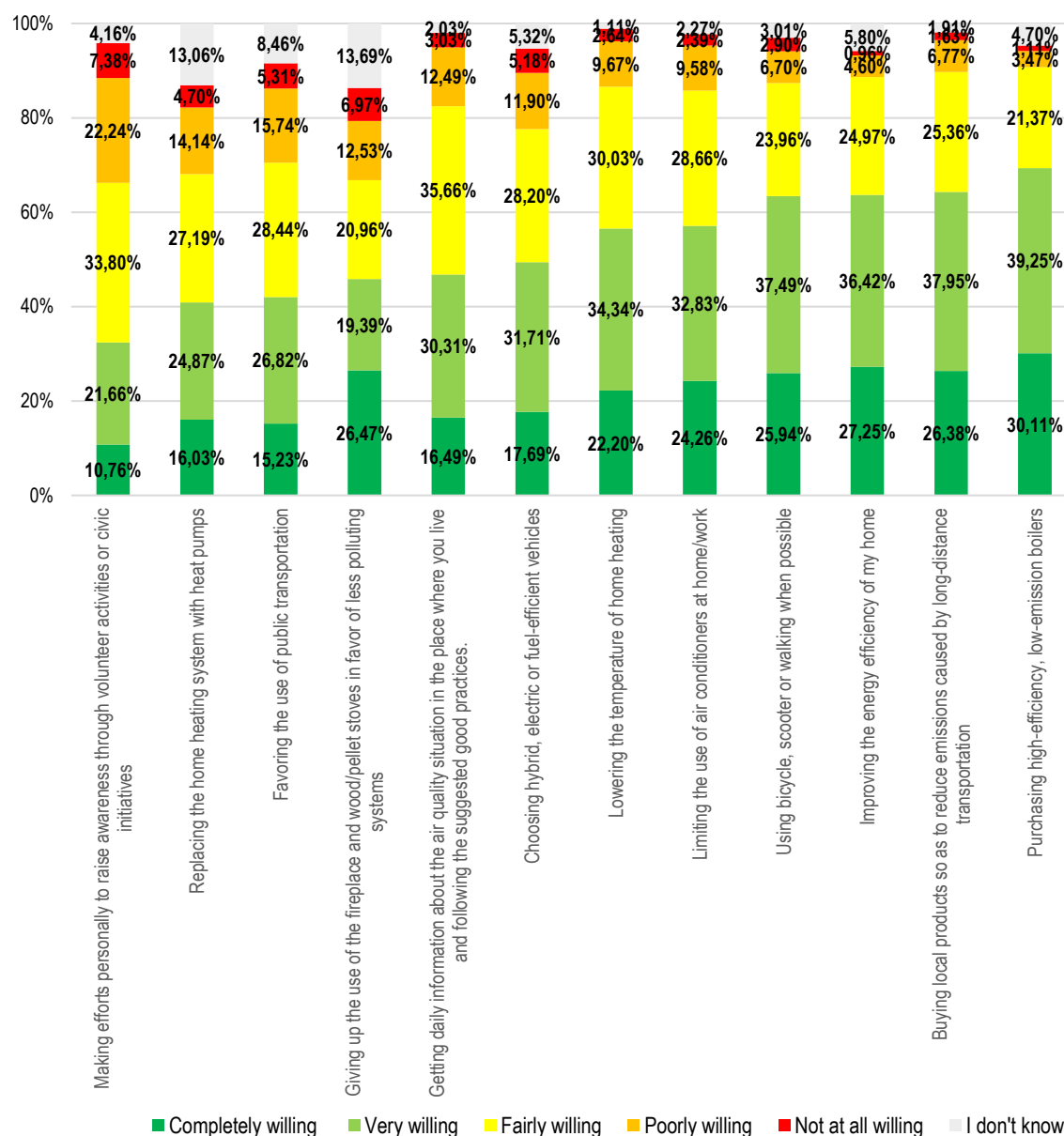
Figure 15 - Initiatives deemed most effective under the PREPAIR project



Fact 5 - Behaviors to Reduce Air Pollution

One question posed in the questionnaire deals directly with the behaviors citizens would be willing to implement to reduce air pollution (Figure 16). The questionnaire included a set of best practices with respect to which willingness to implement them was requested. For all these good practices, more than 60% of respondents say they are at least fairly willing to implement them. The practice that registers the lowest level of willingness relates to in-person efforts to raise awareness through volunteer activities or civic initiatives. This finding confirms what was found in the previous survey. In contrast, the highest level of willingness is recorded with reference to the purchase of high-efficiency, low-emission boilers, for which respondents say more than 60% are at least "very willing" and about 90% are at least "fairly willing". This result is also in line with the previous survey.

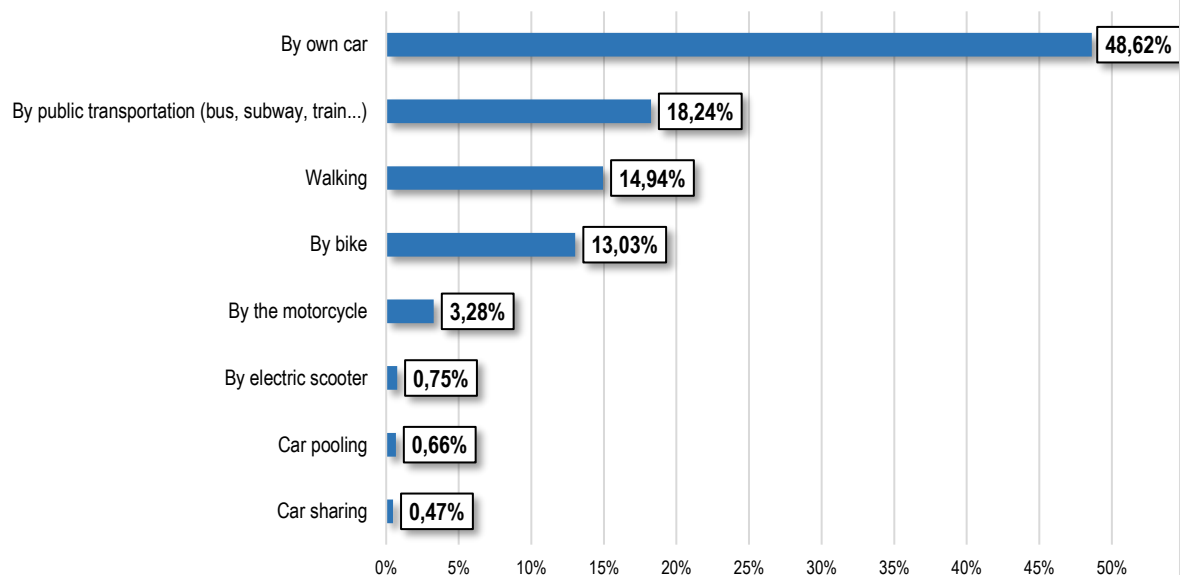
Figure 16 - Willingness to implement the following behaviors



Another behavioral question in the questionnaire concerns the means used to travel to work (Figure 17). As might be expected, by far the most popular means used by citizens responding to the questionnaire is their own car (48.62%) (in line with the previous survey), followed by public transportation (18.24%), a gap of about 30 percentage points. A good number of citizens also claim to walk to work (14.49%) and ride a bicycle (13.03%). However, if we sum the percentages of citizens who say they walk and/or bike to work, the value is 27.52%, ranking second, as in the previous survey, where there was only one response option for walking/biking. Very infrequent, on the other hand, is the practice of travelling to work using "newer" means such as electric scooters, carpooling and car sharing, none of which exceeds 1%.



Figure 17 - Means of transportation used to travel to work



Fact 6 - Profile of the Respondents

The goal of a cluster analysis is to trace a sample, even a very large one, back to a few groups made up of the most homogeneous subjects among them, so that contrasting similarities and differences can be delineated.

The objective of the present cluster analysis was to reconcile the more than 7,000 citizens sampled to a circumscribed number of groups so that prevailing profiles and related trends on the issue of air quality and its possible improvement could be traced. The analysis was thus aimed at detecting similarities and significant differences among the respondents in terms of:

- perceptions about air quality,
- level of information on air quality,
- sources of information,
- behaviors and initiatives to be implemented for air quality improvement.

These aspects were investigated through 10 variables, which made it possible to distinguish clusters within the survey sample.

The analysis distinguished four groups of citizens distinguished primarily in terms of their willingness or unwillingness to implement behaviors and initiatives to improve air quality. Based then on the results of the analysis, four citizen profiles were identified:

- "Engaged and proactive": very willing to implement virtuous behaviors for the improvement of air quality;
- "Willing to engage, but to a fair extent": somewhat willing to implement virtuous behaviors;
- "Win-win approach": not very willing to implement virtuous behaviors, except those that involve a direct economic return;

- "Disinterested and unwilling": low willingness to implement virtuous behaviors, lower than the other groups.

Table 1: Classification and number of the four clusters

Classification of the profile of citizens	Brief description of the profile	Cluster numerosity
Engaged and proactive	Citizens who perceive little worsening of air quality in recent years, well informed and very willing and proactive toward adopting behaviors to improve air quality. They are also supportive of air pollution mitigation initiatives.	2.437
Willing to engage, but to a fair extent	Citizens who perceive a worsening of air quality in recent years, average informed and average inclined to take personal initiatives aimed at improving air quality.	1.048
Win-win approach	Citizens who perceive a marked worsening of air quality in recent years and who are poorly informed. They are also unwilling to adopt behaviors to mitigate air pollution, except for actions that result in direct economic benefit.	1.631
Disinterested and unwilling	Citizens who, despite perceiving a marked worsening of air quality in recent years, are nonetheless poorly informed and very unwilling to take action to improve air quality. They are, moreover, unfavorable toward mitigation initiatives.	1.190

Figure 18 - Distribution of sample in the four cluster

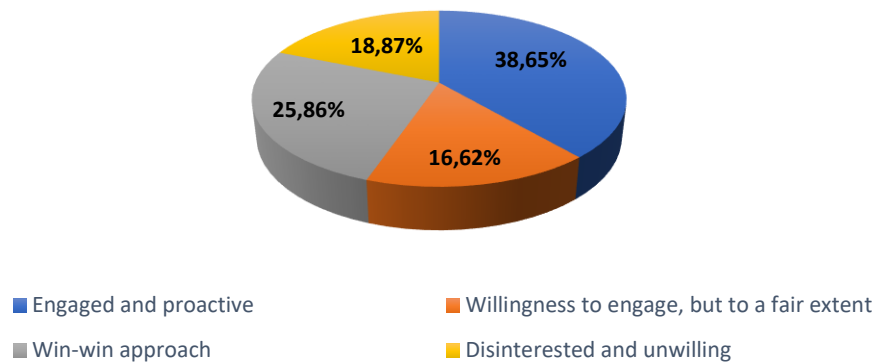
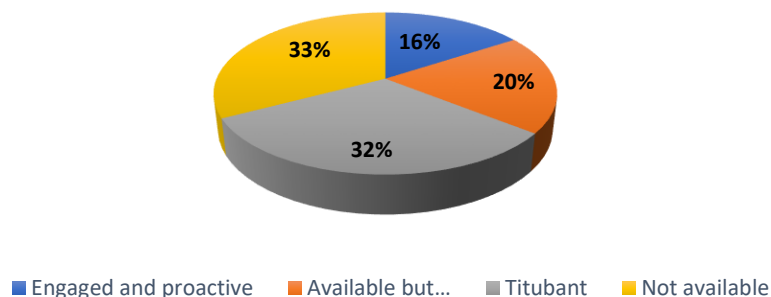


Figure 19 - Distribution of the sample in the four cluster in the previous survey (2019)



A detailed analysis of the four clusters reveals some substantial differences:

Engaged and proactive. This is the largest cluster and the one in which citizens who demonstrate a greater willingness to engage in air quality improvement converge. These citizens are also very supportive of implementing initiatives to mitigate air pollution. Their perception of the change in air quality over the past 10 years is somewhat less worse than the other groups. It is also the group in which its member citizens appear to be most informed about air quality. Web and social networks appear to be the main sources of information about air quality.

Willingness to engage, but to a fair extent. The citizens who make up this cluster are the least numerous and only partially demonstrate a willingness to commit to improving air quality. This group rates air quality over the past 10 years more worsening than the "Engaged and proactive" cluster, but less than the other two clusters. The perception of the level of information on air quality by citizens in the "Willing to engage, but to the right extent" cluster is at a medium level. The predominant sources of information for this cluster are newspapers and radio, followed by TV. In contrast, the web seems not to be contemplated as a source of information.

Win-win approach. This cluster includes citizens who show little willingness to take action to improve air quality, except for actions that not only benefit the environment but also result in personal economic benefit. For this cluster, there is a negative perception regarding the change in air quality over the past

10 years. In addition, citizens in the "Win-Win Approach" cluster present the lowest level of information about air quality. The most used sources of information turn out to be cell phone apps and social networks, while newspapers are not even considered.

Disinterested and unwilling. This cluster includes citizens who show the absolute least interest in engaging in efforts to reduce air pollution. Despite being those who perceive a higher worsening of air quality, these citizens state that they are very unwilling to implement any necessary behavior to reduce air pollution. Even with regard to mitigation initiatives, this cluster does not appear favorable. The "disinterested and unwilling" citizens also appear to be poorly informed on the subject of air quality. By far the most used source by citizens who fall into this cluster is TV.

Conclusion

The six factors described represent a simplification and an interpretation of the research and for this reason they can already be considered a conclusion. However, it is clear that there are many considerations that could be made and for these we refer to the investigation document in its entirety. Interestingly, the "Engaged and Proactive" cluster is the most numerous (38.65 percent). This statistic is a very positive signal, as it means that Po basin citizens show the propensity to change their lifestyles and engage in improving air quality. Another very significant finding is the high percentage (65 percent) of respondents who believe air quality has worsened over the past 10 years. This perception may increasingly lead people to adopt responsible and mitigating air pollution behaviors in order to reverse the perceived negative trend. Note that the "Engaged and Proactive" cluster has increased by far compared to the previous PREPAIR report (38.65% vs. 16%). This result can be justified by the increasing awareness among citizens that their own engagement is critical to addressing air quality issues.



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THE PROJECT PREPAIR

The Po Basin represents a critical area for the quality of air, as the limit values of fine powders, nitrogen oxides and ozone set by the European Union are often exceeded. The northern Italian regions re included in this area as well as the metropolitan cities of Milan, Bologna and Turin.

This area is densely populated and highly industrialized. Tons of nitrogen oxides, powders and ammonia are emitted annually into the atmosphere from a wide variety of polluting sources, mainly related to traffic, domestic heating, industry, energy production and agriculture. Ammonia, mainly emitted by agricultural and zootechnical activities, contributes substantially to the formation of secondary powders, which constitute a very significant fraction of total powders in the atmosphere.

Because of the weather conditions and the morphological characteristics of the basin, which prevent the mixing of the atmosphere, the background concentrations of the particulate, in the winter period, are often high.

In order to improve the quality of the air in the Po Valley, since 2005 Regions have signed Program Agreements identifying coordinated and homogeneous actions to limit emissions deriving from the most emissive activities.

The PREPAIR project aims at implementing the measures foreseen by the regional plans and by the 2013 Po Basin Agreement on a wider scale, strengthening the sustainability and durability of the results: in fact, the project involves not only the regions of the Po valley and its main cities, but also Slovenia, for its territorial contiguity along the northern Adriatic basin and for its similar characteristics at an emissive and meteorological level.

The project actions concern the most emissive sectors: agriculture, combustion of biomass for domestic use, transport of goods and people, energy consumption and the development of common tools for monitoring the emissions and for the assessment of air quality over the whole project area.

DURATION

From February 1st 2017 to January 31 2024.

TOTAL BUDGET

17 million euros available to invest in 7 years: 10 million of which coming from the European Life Program.

COMPLEMENTARY FUNDS

PREPAIR is an integrated project: over 850 million euros coming from structural funds and from regional and national resources of all partners for complementary actions related to air quality.

PARTNERS

The project involves 17 partners and is coordinated by the Emilia-Romagna Region – General directorate for the territorial and environmental care..





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