urban science

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Air Quality Awareness—Empirical Evidence from a Comparative Perspective between Two European Cities

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Abstract: This research, conducted as part of the European project PA-MAP (Participatory Approach to Monitoring Air Quality in Urban Environments), investigates citizens' perceptions of air pollution in two European cities: Turin (Italy) and Dublin (Ireland). We systematically collected social data through semi-structured surveys distributed via online platforms. Our aim was to gather comprehensive information on the perception of pollution sources and the effectiveness of control systems. We examined citizens' habits and their suggestions to improve air quality. The results revealed the following: (1) In Turin, the perception of air pollution significantly influences individuals' self-assessments of health. Consequently, increased vigilance is required to mitigate environmental health risks and to disseminate information on air quality and effective practices for reducing air pollution. (2) The use of sustainable transportation in Turin is hindered due to the inadequate maintenance of cycling infrastructure. Citizens prefer to use cars or trains, which facilitate rapid travel. (3) In Dublin, greater sensitivity to the problem of air pollution has emerged, and the use of sustainable means of transport is facilitated via ad hoc infrastructure. These results provide empirical evidence to policymakers to support the promotion of concrete local actions through which to improve air quality.

Keywords: air quality; citizen behavior; qualitative survey; Europe

Citation: Salimbene, O.; Baeza-Romero, M.T.; Pilla, F.; Čok, G. Air Quality Awareness—Empirical Evidence from a Comparative Perspective between Two European Cities. *Urban Sci.* **2024**, *8*, 133. https://doi.org/10.3390/urbansci8030133

Academic Editors: Luis Hernández-Callejo, Sergio Nesmachnow and Pedro Moreno-Bernal

Received: 19 May 2024
Revised: 11 August 2024
Accepted: 20 August 2024
Published: 1 September 2024

1. Context and Motivation

Air pollution constitutes a major environmental problem and presents continuous risks to human health. Scientific evidence links air pollution to a range of acute and chronic diseases, including cardiovascular diseases, stroke, respiratory diseases, and cancer (World Health Statistics Report 2021) [1]. The European Environment Agency (Air Quality Report, EEA 2022) reported 238,000 premature deaths in Europe in 2020, while the World Health Organization estimates approximately 6.7 million premature deaths worldwide [2]. Extensive research consistently identifies air pollution as the fourth most significant health risk factor [3–5], and current medical evidence highlights that both short-term and long-term exposure to air pollution can lead to acute and chronic health conditions [6–8].

The Air Quality Index (AQI) serves as a vital parameter for assessing the impact of air quality on individual well-being [9,10]. However, in an era of increasing urbanization, citizens' perceptions can be a crucial indicator for evaluating the effectiveness of environmental policies and planning targeted interventions in social, environmental, and clinical sectors. In recent years, with the rise in research on risk perception, air pollution, as an environmental risk, has garnered significant attention from scientists [11,12].

Consequently, several European projects have been funded to improve air quality in Europe [13–15]. Building sustainable cities requires a strong commitment to addressing

environmental problems that adversely affect citizens' health. National protocols and the European Green Deal include a series of measures aimed at reducing greenhouse gases, improving energy efficiency, and protecting biodiversity. Additionally, the ambition to achieve climate neutrality by 2050 necessitates a progress-monitoring system that ensures a socio-economically efficient green transition and a consequent reduction in air pollution to mitigate its impact on public health. Empirical research on the perception of air pollution is needed, and it should involve specialists from different sectors, expanding investigations and data collection to the clinical, urban, and social spheres.

Addressing air pollution shares similarities with tackling other adverse effects in urban environments, such as heat islands, noise, and light pollution. The complexity of this issue necessitates a comprehensive understanding, as implementing effective solutions relies on both the availability of reliable data and strategic decision-making in urban development. Preventive and remedial measures can be designed at various scales—individual buildings, neighborhoods, and entire cities. However, these decisions require significant time and resources. Therefore, any research that provides policymakers with credible evidence on air pollution, its sources, and potential solutions is crucial.

Despite the priority given to these issues, interdisciplinary studies that examine how social, clinical, and environmental data influence citizens' perceptions of air quality remain scarce. The existing literature on this topic explores citizens' perceptions across various regions, contexts, and methodologies. For instance, a study conducted in China investigated the perception of air pollution and its impact on residents' health. Findings revealed that perceptions of air pollution significantly affect both self-rated health and mental health, underscoring the need to consider public perception as a critical component in managing air pollution and developing health policies [16]. Additionally, a survey conducted in Portugal assessed perceptions of air quality among the general population and a specific subgroup from an industrial area in the Lisbon metropolitan area. This study found that 61% of residents in the industrial area rated the air quality as "poor", compared to only 14% of the general population, highlighting heightened concern about air pollution in industrial areas relative to less polluted ones [17]. Current research predominantly focuses on developed countries [18–22], with a notable gap in studies from developing countries, where challenges include limited resources and technology. Some researchers have suggested using direct interviews in various European capitals [23–25]. For example, a study in Brussels collected social data through direct offline interviews, but this approach has several limitations, including a restricted sample size, high costs, time consumption, logistical complexity, and the constraints of conducting interviews in limited areas.

The literature indicates a need for social analyses that incorporate strategic indicators and the georeferencing of participants, which would allow for correlating citizens' perceptions with objective local concentration data. Additionally, the review highlights that studies on the effects of air pollution on physical and mental health often occur independently, leading to incomplete and non-systematic research. Contextual variations, such as differing air quality standards, further limit the explanatory power of findings in developing countries. Regarding social analyses of air quality perception, scientific studies have primarily focused on developed regions [26–28].

Assessing the impact of air pollution on residents' health through both offline and online social questionnaires, as well as co-creative actions, is of practical significance. Such assessments facilitate the evaluation of health risks associated with air pollution, promote healthy living environments and sustainable practices, enhance urban mobility, and aid in the prevention of related pathologies [29,30].

Main Findings and Contributions

Despite these efforts, air quality issues persist in many European cities [31,32], underscoring the necessity for new indicators based on social analysis and citizens' perceptions to improve environmental policies and urban living conditions. Specifically, to our knowledge, no social surveys have been conducted in the cities examined in this study that include

specific questions about control systems, the impact of pollutants (such as particulate matter and black carbon), and personal actions taken to improve air quality. This research, conducted within the PA-MAP project, addresses these gaps by presenting findings from quantitative and qualitative investigations into urban air quality perception in Turin (Italy) and Dublin (Ireland).

Since the implementation of recent policy reforms, Italy and Ireland have experienced rapid economic development, leading to persistent environmental pollution issues, particularly in Northern Italy [33,34]. The health risks associated with air pollution have become a major public concern in these regions, prompting several institutional agreements aimed at improving air quality [35]. The proposed survey serves as a crucial resource for providing policymakers with detailed information on air quality and traffic management in both an industrial-Mediterranean context and a Nordic urban context.

This research seeks to augment the limited body of qualitative research in this field by examining perception from various complementary perspectives. It is divided into four sections: demographic information, air quality perception, trust in institutions, and suggestions to improve air quality, including the use of cycling infrastructure. The study explores how cultural, political, and demographic factors influence citizens' opinions and proposes tailored strategies to address environmental challenges specific to each city. One innovative aspect of this research is the collection of concrete suggestions related to air-monitoring systems and cycling infrastructure. The data gathered provide unique insights into key factors that either hinder or promote cycling.

This comparative and participatory approach not only evaluates citizens' perceptions but also offers practical recommendations based on empirical data to improve air quality and sustainable mobility in the cities studied. The research also aims to investigate citizens' trust in local institutions. It employs qualitative methods, chi-square tests, and basic statistical analyses to assess how age and profession influence air quality perceptions, information levels, and communication channels used by citizens.

Additionally, the research examines two critical aspects: first, the actions citizens are willing to take to improve air quality; and second, proposals for enhancing air quality within their cities. Citizens' opinions on air quality were compared with objective local air quality data published by environmental protection authorities. The study also considered local infrastructure that supports the use of sustainable transport, with urban cycling infrastructure analyzed using OpenStreetMap data [36]. The findings indicate that inadequate cycling infrastructure discourages bicycle use, and a heightened perception of air pollution correlates with worsened self-assessed health and increased health concerns. Citizens tend to trust institutions more when there is a higher presence of monitoring stations. These results have significant implications for research and policy aimed at improving air quality and public health, emphasizing the need to address non-users' motivations for sustainable transport.

This social investigation is highly relevant to both the academic community and policymakers. The findings highlight several key aspects:

1. Informing policy decisions: The collection of social data enables informed decision-making and the development of policies that address citizens' concerns. For example, our research identifies issues related to cycling infrastructure in Turin. Negative perceptions of infrastructure, urban spaces, or air quality should prompt the city's administration to implement more rigorous measures that promote and encourage the use of bike-sharing systems or private bicycles.
2. Evaluating policy effectiveness: The collected data serve as a foundation for assessing the effectiveness of existing policies. For instance, the positive perception of air quality and the quality of the cycling infrastructure network among Irish citizens indicate that the current policy measures are functioning well and should be continued and reinforced.
3. Identifying research priorities: The results suggest areas for further research. This study highlights specific concerns in the two cities that could lead to new investiga-

tions into the causes and effects of these perceptions. Future studies could adopt more comprehensive and inclusive methodological approaches, such as online and offline questionnaires and the use of low-cost sensors in various city areas.

4. Community involvement: The survey positively impacts community engagement by involving citizens in the decision-making process. When individuals feel heard, they are more likely to support and adhere to the policies implemented.

Overall, the proposed study provides an empirical foundation for improving public policies, assessing their impacts, and guiding future research, thereby contributing to the enhancement of quality of life in the studied urban contexts. These results should encourage local policymakers to intensify efforts to combat air pollution and protect residents' health. The comparison between two European cities, Turin and Dublin, offers a unique perspective on how different infrastructures and local sensitivities influence citizens' perceptions and the adoption of sustainable transportation practices. The research specifically highlights how the perception of pollution in Turin affects self-assessed health, an area of study that is not widely explored. The analysis of infrastructural barriers in Turin and infrastructural facilitations in Dublin provides practical and applicable insights for policymakers, based on empirical evidence gathered through a participatory approach. The research specifically highlights how perceptions of pollution in Turin influence self-rated health, an area of study that is not widely explored. It highlights the psychological and subjective dimensions of environmental health, which are often overlooked in traditional air quality studies.

The analysis of infrastructure barriers in Turin and infrastructure facilitators in Dublin provides practical and applicable insights for policymakers, based on empirical evidence gathered through a participatory approach. This evidence-based approach not only increases the credibility of the findings but also ensures that recommendations are based on real-world experiences and citizen feedback. This study stands out for its comparative approach, which reveals how local contexts shape environmental perceptions and behaviors. By integrating health perceptions and infrastructure analysis, it provides a comprehensive view that can guide targeted policy interventions. The participatory methodology further enriches the research, ensuring that the findings are not only theoretical but also practically relevant and actionable.

The research is structured in the following order: context and motivation, materials and methods, results and discussion, and conclusions and future work.

2. Materials and Methods

A transnational comparison of air quality perception serves as a valuable tool for observing differences and similarities across various geographical, cultural, and regulatory contexts.

A qualitative analysis based on a semi-structured, anonymous questionnaire was conducted to investigate the level of public awareness regarding air pollution in two European cities: Turin and Dublin. Turin was selected as a study area for two primary reasons: (1) its unique meteorological and geographic conditions in the Po Valley, which is one of the most polluted regions in Europe during both summer and winter [37], and (2) its high density of vehicular emissions, which ranks among the highest in Europe [38]. In contrast, Dublin is one of the capitals with high levels of citizen satisfaction regarding both quality of life and the quality of public transport [39–41].

The data collection process involved using an online form, and the interview protocols adhered to the legal regulations on the protection of personal data specified in Legislative Decree 196/2003 [42]. Additionally, these protocols were updated according to the new Legislative Decree 101/2018 [43] to align Italian legislation with the European privacy regulation [44]. Before its implementation, the survey underwent preliminary testing by the research team to validate its reliability and ensure clarity and understandability. Closed and open questions were used to gather suggestions from citizens. The questionnaires were disseminated via email and on the websites of local cultural institutes, remaining available online for six months during 2023. To minimize nonresponse bias, various strategies were

employed, including creating simple and clear questions and maintaining a survey length that allowed responses to be completed within a maximum of eight minutes. Data collection targeted a stratified population of residents in Turin and Dublin aged over 18 years. As previously mentioned, the questionnaire was administered via email, which naturally excluded segments of the population who were not using the internet. This limitation could be addressed in future studies by incorporating both online and offline data collection methods. The survey comprised 20 questions divided into four main sections:

- Section 1: demographic information (gender, age, education, and profession).
- Section 2: perception of air quality (using the Likert scale model for various aspects and including open questions for further comments).
- Section 3: suggestions to improve air quality (open questions).
- Section 4: the use of cycling infrastructure (closed and open questions).

The investigations also aimed to identify the primary sources of air pollution in the city and determine the main communication channels residents use to access real-time updates on local air quality. Statistical and thematic analyses enabled the comparison of citizens' perceptions and the collection of concrete suggestions to improve the environmental situation and promote the use of sustainable transportation in the two cities.

Citizens were asked about their health-related concerns and their level of satisfaction with local political management regarding urban air pollution prevention. The pilot study facilitated the investigation of citizens' trust in local institutions and the primary means of transport used for short and long journeys. Moreover, the study examined disparities between residents' perceptions of air pollution sources and the officially recognized primary causes of air pollution reported by government authorities.

3. Results and Discussion

The results obtained are summarized in Tables 1 and 2. Table 1 provides an overview of the demographic data collected from participants in the two European cities. Table 2 presents both crude odds ratios derived from bivariate logistic regression analyses and adjusted odds ratios from the multivariable logistic regression model, along with 95% confidence intervals and *p*-values.

Table 1. Demographics data, absolute frequency, and percentage values.

Place of Residence	Dublin City & Countryside (%)	Frequency	Torino City & Countryside (%)	Frequency
Gender				
Male	42.4	163	44.8	172
Female	57.2	220	54.9	211
Age				
19–28	29.9	115	23.9	92
29–39	34.4	132	32.03	123
40–65	27.3	105	39.06	150
>65	7.8	32	4.9	19
Education level				
Elementary	/		0.78	3
Secondary school	23.9	92	8.07	31
Hight school	30.7	118	23.9	92
University degree	41.9	161	59.1	227
Other	3.4	13	7.8	31
Job				
Student	20.3	78	15.3	59
Self-Employed	31.5	121	15.1	58
Employee	39.3	151	54.4	209
Unemployed	8.6	33	5.7	22
Other	0.26	1	9.1	36

Table 2. Age and educational level. Demographics data, absolute frequency, and percentage values.

	Crude OR			Adjusted OR		
	OR	**95%CI**	***p*-Value**	**OR**	**95%CI**	***p*-Value**
Age						
Age 40 to Age <40	0.48	0.48, 0.80	0.006	0.34	0.34, 0.9	0.035
Educational level						
High School (HS) to <HS	1.63	1.63, 3.5	0.00002	1.15	1.15, 3.02	0.015
College to <HS	2.70	2.70, 5.1	<0.00001	1.5	1.5, 3.81	0.0003

As shown in Table 1, the study involved citizens aged between 19 and 65 from Turin and Dublin. For comparative purposes, a total of 768 questionnaires were collected, with 384 responses from each city. Notably, 100% of the questionnaires met the study criteria, with each participant providing one response and completing at least 85% of the questions. In Turin, 39.1% of the responses were from citizens aged between 40 and 65, while in Dublin, participation by age group and education level was more evenly distributed. Among the respondents, Irish citizens aged between 29 and 39 accounted for 34.4% of the responses. Additionally, Irish students were highly engaged, contributing 20.3% of the responses, compared to 15.3% in the Turin sample. Female participants showed higher engagement, making up 57.2% of the respondents in Dublin and 54.9% in Turin. Overall, the pilot study had a greater representation of women (432) compared to men (336). Notably, young Irish individuals aged between 19 and 28 demonstrated greater awareness of air pollution issues (29.9%) compared to their Turin counterparts (23.9%) (see Table 2). This difference could be attributed to more robust air quality initiatives within the Irish university context. Furthermore, Dublin recorded a higher participation of older individuals (7.8%) compared to Turin (4.7%). Specifically, Dublin supplied a total of 247 participants under the age of 40, while Turin supplied 215 participants in the same age bracket. All participants reported residing in urban areas. Among the respondents in Dublin and Turin, the majority held a university degree (41.9% vs. 59.1%) or a high school diploma (30.7% vs. 23.9%). The respondents' employment status varied: 39.3% of Dublin respondents were employed, while 31.5% were self-employed. In contrast, Turin showed a significant difference, with only 15.1% working in the private sector and 54.4% being state employees. The percentage of unemployed participants was higher in Dublin (8.5%) compared to Turin (5.7%). Chi-square tests of independence were used to explore associations between participants' age, gender, education level, and beliefs regarding sources of air pollution and preferred information channels. A *p*-value of less than 5% was considered statistically significant. The bivariate analyses depicted in Table 2 showed that participants' age and education level were associated with air pollution awareness at a 5% significance level. The survey results highlight a robust and non-random relationship between these factors and the perception of air pollution.

3.1. Citizen's Perception of Air Pollution

In Turin, 42% of interviewees reported that the air quality was poor, while 36% perceived it as dangerous. Only 19% considered the air to be healthy. Conversely, in the Irish capital, the situation was markedly different. Approximately 72.6% of the Irish respondents asserted that they breathed good air, while 22.2% believed they inhaled polluted air. Only 3% of respondents described Dublin's air quality as mediocre. Figure 1 graphically summarizes the findings regarding air quality perception in these two European cities.

Among the respondents in Turin, there was notable discontent and mistrust towards institutions. This sentiment may partly explain the emergence of several associations and independent movements in Turin in recent years, which aim to raise awareness about air pollution and monitor specific gaseous pollutants using passive sensors distributed among citizens [45]. One prominent organization is "Torino Respira", a volunteer initiative focused on improving air quality through public events and the collection of environmental data via passive sensors. It is important to highlight that this study intentionally excluded environmental activists and members of private and public associations from the qualitative

investigation to avoid influencing the results. During the survey, the participants were asked to identify the primary sources of pollution in their cities from a list of options, including construction, incineration, heating, energy production, and transport. In Turin, the respondents predominantly identified three main contributors to air pollution: transport (58.3%), heating systems (18.2%), and energy emissions from production plants (11.45%). In contrast, the Dublin respondents primarily identified transport as the main source of pollution (66.6%), followed by heating (16.4%). Incineration plants (6.25%) and energy production facilities (5.6%) were reported as lesser contributors (see Figure 2).

(**a**) (**b**)

Figure 1. Participants' perception of air quality in Turin and Dublin.

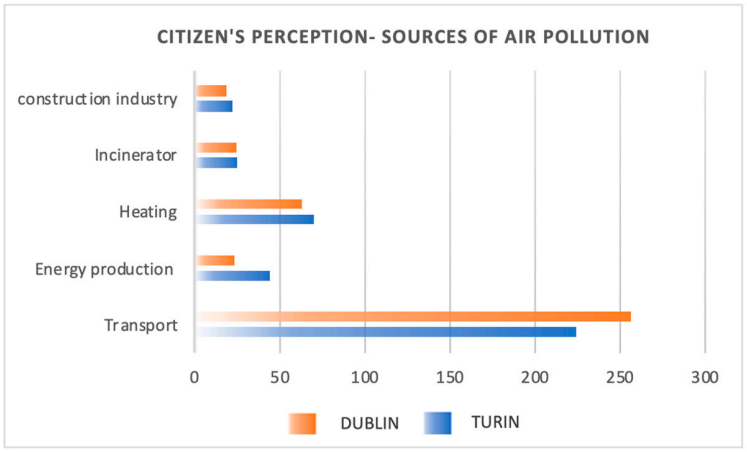

Figure 2. Citizens' perception of the main sources of air pollution in Dublin and Turin.

According to data published by the Municipality of Turin, 87% of the primary PM10 emissions are associated with transportation, with 38% of total emissions coming from transportation and 49% from heating systems [46]. Additionally, regional and municipal authorities periodically release reports on major sources of pollution, which are available online and include data on sources, concentration trends, and details about monitoring campaigns [47]. In Dublin, some studies suggest that traffic emissions have a less significant impact on residential areas compared to heating emissions. Various articles have addressed the effects of traffic on air quality and the variability of NOx levels in road canyons [48–50]. Data on air pollution sources in the Irish capital are also accessible through the EPA and municipal websites, which outline Ireland's national environmental policies and integrated policy frameworks [51].

Our survey results align with the existing literature, showing that transportation is the predominant contributor to urban air pollution, with heating systems also playing a substantial role. Participants in our study exhibited a strong awareness of these major pollution sources, consistent with the findings of local authorities. Despite this awareness, overcoming entrenched behaviors and encouraging the adoption of sustainable transport options in Turin remain a significant challenge. These challenges are compounded by issues related to cycling infrastructure, which we explore further below.

3.2. Means of Transport Used and Commuting

The survey aimed to evaluate citizens' preferences for sustainable and low-pollution modes of transportation during daily commutes (see Table 3). In Turin, 58.1% of the respondents reported using bicycles or walking exclusively for short trips. In contrast, Dublin showed a higher percentage, with 67.5% favoring these eco-friendly options. Despite the significant proportion of bicycle users in Turin, 54.9% indicated that they used bicycles solely for short journeys (less than 1 h), unlike in Dublin. In the Irish capital, citizens demonstrated a greater commitment to sustainable transportation. Bicycles were identified as the primary mode of commuting to work and school, with 30.8% of respondents using them for approximately 3 h daily, compared to around 10% in Turin.

Table 3. Means of transport used by the interviewees in Turin and Dublin during their daily commutes, as well as the time of use and motivation for their choice of means of transport.

		TORINO (%)	DUBLIN (%)
	Do you travel by bike or on foot in your city?		
	Yes	58.1	67.5
	Not	19.3	14.5
	Rarely	22.6	17.9
	If yes, for how many hours a day?		
	1 h	54.9	34.2
	2 h	28.4	20.5
	3 h	10	30.8
	4 h	4.1	12
	>4 h	1.9	2.6
	What means of transport do you use most regularly?		
	Car	35	11.1
	Bike	17.3	41.9
	Bus	15.6	29.1
	Subway	10.9	2.9
	Train	2.4	7.7
	I walk	16	7
/	Other	2.7	1.7
	Why do you use this means of transport?		
	It is comfortable	45.5	33.3
	It is cheap	7.9	12.8
	It is fast	19.9	17.9
	Doesn't pollute	15.1	27.4
/	Other	11.6	8.5

Additionally, 41.9% of respondents in Dublin primarily used bicycles for commuting to work, whereas only 17.3% of those in Turin preferred bicycles for this purpose. In Turin, car usage for work-related commutes was predominant, with 35% of respondents indicating it as their primary mode of transport. This was followed by bicycles (17.3%), walking (16%), buses (15.6%), the subway (10.9%), and other options, such as electric scooters (2.7%). In Dublin, cars ranked third at 11.1%, behind bicycles and buses, which accounted for 29.1%. When asked to explain their choice of the most frequently used mode of transport, respondents from both cities cited comfort and practicality as the key factors influencing their decisions.

Dublin's well-established network of cycle paths significantly enhances citizens' mobility, while Turin faces ongoing challenges due to an underdeveloped cycling infrastructure. Irish respondents displayed a strong environmental consciousness, highlighting the importance of using low-impact transportation methods. Specifically, 27.4% of Dublin participants expressed a strong aversion to pollution and demonstrated greater environmental sensitivity compared to their Turin counterparts. Conversely, respondents in Turin prioritized comfort and speed when selecting transportation options, with sustainability considerations being less prominent, ranking third at 15.1%. Table 3 provides a summary of the key findings from the interviews conducted in Turin and Dublin regarding transportation preferences.

3.3. Attitudes Toward Governmental Policy for the Management of Urban Air Quality and Citizens' Suggestions

During the survey, all participants were asked about their awareness of air quality-monitoring systems in their respective cities. In Turin, 31% of respondents reported being uninformed about air quality monitoring, whereas only 12.8% of Dublin respondents indicated a lack of awareness. Both cities identified websites and radio as the primary sources of information. However, in Dublin, 21.4% of respondents reported using specialized apps for air quality information. Regarding fixed monitoring stations, over half of the participants were aware of such stations' existence. In Dublin, 33.9% of respondents believed these stations provided an adequate analysis of the city's air quality. In contrast, Turin displayed significant skepticism and dissatisfaction with institutional systems. Specifically, 46% of Turin interviewees expressed dissatisfaction with the effectiveness of these systems, and 62% felt that PM concentration limits were not being adhered to. These findings may be influenced by negative media coverage of air quality issues in the Po Valley. It is difficult to determine whether Turin residents' perceptions of risk are due to high pollutant levels or influenced by media reports. In Turin, 68.7% of participants expressed health concerns related to air pollution and acknowledged inhaling unhealthy air, a situation markedly different from Dublin. Although Irish respondents were aware of the health effects of air pollution, only 35% expressed concern. Table 4 summarizes these findings.

Table 4. Participants' knowledge of air quality-monitoring systems and their efficiency, as well as the perception of health risk and compliance with limits.

	TURIN (%)	DUBLIN (%)
Do you check the air quality information in you city?		
Not	31	12.8
Web	27.6	31.6
Radio	23.9	31.6
App	9.1	21.4
I am an activist	3.4	0.9
Other	5.1	1.7
Do you know that there are fixed PM monitoring stations in your city?		
Yes	57.5	53.3
No	42.5	44.7

Table 4. *Cont.*

	TURIN (%)	DUBLIN (%)
Do you think these control systems are enough to monitor air quality?		
Yes	10.3	33.9
Not	46	9.6
I don't know	43.6	56.5
Do you think that the legal limit (PM) are respected in your city?		
Yes	10.2	47
Not	62	/
I don't know	27.8	53
Do you think air pollution harms your health?		
Yes	68.7	35
Not	3	6
I don't know	15.2	29.9
Not a lot	10.4	28.2
Only the weak (Children and elderly)	2.7	0.9

3.4. Citizens' Attitudes Toward Local Government

The qualitative analysis explored participants' attitudes toward government policies designed to improve air quality and their trust in institutions. In Turin, only 5.8% of the respondents expressed satisfaction with the political management of urban air quality. In contrast, 42.7% of the respondents in Dublin reported contentment with local policies and administrative management. Notably, 47.9% of Dublin participants chose not to provide a definitive response but expressed strong confidence in institutional effectiveness (see Figure 3).

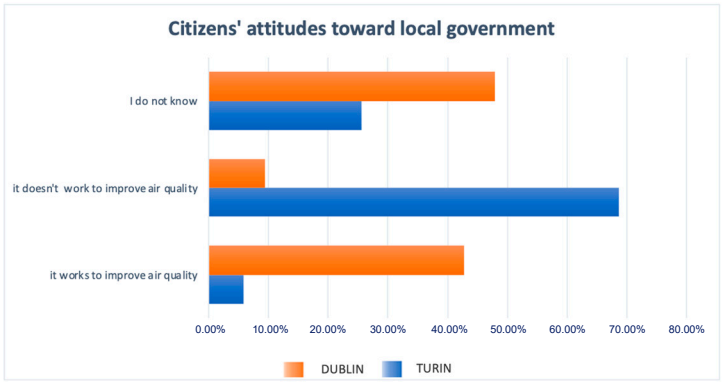

Figure 3. Participants' opinions regarding governmental action aimed at air pollution management.

The social survey incorporated questions aligned with the PA-MAP principles, specifically targeting "Actions for Change"—individual efforts aimed at mitigating and reducing air pollution. Figure 4 displays the responses from participants in Turin. Notably, 37% of respondents reported using energy-saving lamps, while 36% optimized their heating and cooling systems. Additionally, 9% preferred solid fuels, and 18% paid attention to sustainable modes of transport. In contrast, patterns in Dublin revealed different trends. In the Irish capital, 42% of respondents actively employed sustainable transportation methods, thereby lessening their impact on air quality. Furthermore, 22% prioritized optimizing heating systems, 20% were selective about their fuel choices, and 16% used energy-saving light bulbs. Remarkably, all interviewees provided insights into their personal actions.

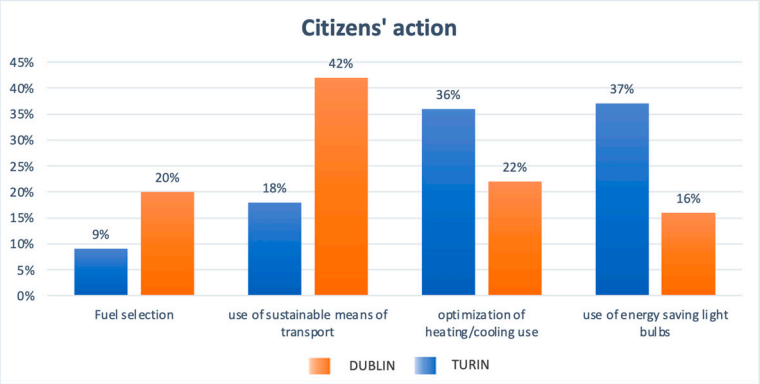

Figure 4. Citizens' actions to limit air pollution in their city.

During interviews conducted in Turin, 68.6% of respondents advocated for the implementation of additional preventive measures to enhance air quality in the city. Key recommendations included increasing the oversight of industrial facilities and emissions (28%) and urging improvements in urban infrastructure and cycling pathways (52%). Additionally, there were calls to restrict waste incineration (20%) (see Figure 5). In contrast, respondents in Dublin emphasized the need for the continued monitoring of wood and solid fuel usage. This focus aligns with the existing literature, which indicates that these factors contribute up to 70% of the ultrafine particulate matter concentrations recorded in the Irish capital [52]. Irish respondents showed a willingness to reduce their reliance on solid biomass and actively adopt sustainable transportation options, supported by effective infrastructure. According to interviewees in Dublin, transportation remained a significant concern, along with emissions from ports and industrial sources, which accounted for 37% of the expressed concerns.

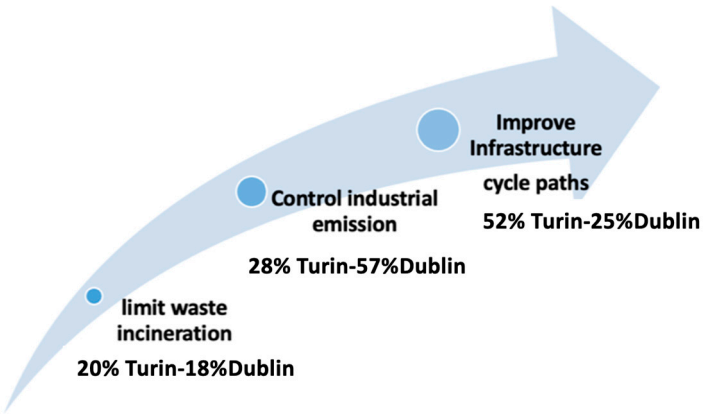

Figure 5. Participant suggestions: the top three areas requiring increased government attention according to citizens' recommendations.

The educational levels in both cities likely influenced the public's understanding of major sources of air pollution. Individuals with higher educational qualifications, such as degrees, demonstrated greater awareness and engagement. These findings are consistent with prior research, which shows that social and economic contexts can affect individuals' awareness of air pollution sources [53]. In Dublin, 27.4% of respondents reported using sustainable transportation to mitigate their contribution to air pollution. Participants from both Dublin and Turin identified urban industrial plants and waste incineration as significant sources of air pollution that require more effective government control. Studies conducted in Ireland further corroborate these public concerns, particularly regarding waste incineration [54].

Several studies have established a direct link between the proximity of incinerators to residential areas and increased mortality rates from certain cancers [55]. In this context, 20% of respondents in Turin expressed concerns about waste incineration. The study also explored participants' attitudes towards government actions related to environmental protection. A significant majority of interviewees in Turin (68.6%) felt that the government's efforts were insufficient, indicating a high level of institutional mistrust. Specifically, 52% of Turin participants suggested that the government should allocate more resources to infrastructure development and the enhancement of cycling lanes—an issue that also ranked as a high priority in Dublin. Conversely, 47.9% of Irish respondents expressed confidence in their local government, and 57% emphasized the need for stronger regulation of industrial emissions and better management of incineration facilities. Notably, while most interviewees in Dublin advocated for improved controls on industrial emissions and incineration, those in Turin focused more on securing funding for urban infrastructure improvements.

In Turin, approximately 201 km of cycle paths exist [56]. However, according to interviewees, the poor maintenance of these paths renders them less usable, which partly explains why many individuals avoid using bicycles for longer journeys. Despite extensive promotional campaigns advocating bicycle usage, the TO-bike bike-sharing stations in Turin were deactivated in February 2023. Nevertheless, other shared public transport systems remain operational. This situation contrasts sharply with Dublin, where City Council initiated the installation of cycle lanes across the city from the 1990s to 2012. Dublin now boasts over 200 km of on- and off-road cycle lanes, accommodating both short and long journeys. Notably, in 2011, Dublin secured the ninth position in the Copenhagenize index of bicycle-friendly cities worldwide. This favorable ranking likely contributes to the interviewees' satisfaction and their strong inclination to utilize bicycles. Dublin's self-service rental system, known as Dublin-bike, features 102 stations citywide with more than 1500 bikes, and it serves over 60,000 subscribers [57]. Since February 13, 2023, the TOBike bike-sharing service in Turin has been replaced with a range of alternatives, including electric scooters managed by Bird, Bolt, Dott, Helbiz, Lime, and Voi, as well as a free-floating bike-sharing service managed by Bolt, Lime, and RideMovi, which allows bicycles to be parked on the street in compliance with regulations. All information regarding sustainable mobility can be found online [58]. Despite the presence of various transport services in Turin, interviewees reported that these options are primarily suitable for short journeys.

4. Conclusions and Future Work

Air pollution has become a significant global challenge. This article presents empirical findings derived from social data on air pollution in two European cities, aiming to investigate citizens' perceptions of air quality. A chi-square analysis was performed to examine how age and education level correlate with awareness of air pollution, revealing how these factors can influence individuals' perceptions and understanding of this environmental issue. The research also assessed participants' knowledge of air quality-monitoring systems and their perceived effectiveness. The findings suggest a need for improved communication and increased awareness regarding the effectiveness of these monitoring systems. The survey was predominantly completed by women, with the highest levels of participation observed among individuals with higher educational qualifications (degrees). The data presented do not establish a direct causal relationship between gender and response behavior. To determine whether observed differences in response behavior are genuinely attributable to gender, rather than other influencing factors, it would be necessary to demonstrate that variables affecting response behavior are independent of gender. Additionally, the qualitative survey gathered information on participants' habits related to air quality and explored potential actions that could be recommended to local governments for enhancing urban air quality. The study revealed five key observations:

1. Monitoring network credibility: A functional and accessible monitoring network that provides real-time data is crucial for enhancing institutional credibility and reassuring citizens. The monitoring network in Turin should be made more pervasive,

accessible, and capable of delivering real-time information to keep the local population consistently informed about air quality.

2. Alignment of perceptions and objective data: There is a significant alignment between residents' perceptions of local air pollution and the objective data from the respective cities. In Turin, air pollution is a well-recognized social issue with notable health impacts on residents [59–61]. Future research should focus on exploring any discrepancies between perceived and objective data to identify and address critical local issues.
3. Health concerns and objective evidence: Citizens' concerns about health contribute to their perceptions of poor air quality. The literature provides objective data on the correlation between air pollution and respiratory diseases in Turin [62–65]. Understanding the relationship between citizens' health concerns and objective evidence of disease can help shape more effective public health policies.
4. Primary sources of air pollution: Survey participants identified transportation and domestic heating as the primary sources of air pollution in both Turin and Dublin. These findings are consistent with objectively measured pollution levels reported in the literature [66] and by local political authorities. Analyzing public perceptions of pollution sources can highlight areas for improvement in managing and communicating air quality.
5. Infrastructure and transport choices: The quality of infrastructure and cycling facilities significantly influences citizens' choices regarding alternative modes of transport for long distances. The study shows that 42% of respondents in Dublin use bicycles for commuting and long journeys. This underscores the importance of investing in dedicated cycling infrastructure to promote sustainable transport options such as bicycles and electric scooters. Improved cycling infrastructure not only supports healthier and more sustainable lifestyles but also delivers economic, environmental, and social benefits. These findings suggest that increased investment in cycling infrastructure could enhance daily transportation options in Turin.

The methodology and findings of this research provide a foundation for developing policies that encourage behaviors to improve overall air quality. Citizens' perspectives and perceptions regarding air pollution have significant potential to drive improvements at the neighborhood level. The study offers a substantial amount of data that can inform local policymakers. By leveraging qualitative investigations, researchers can move from individual viewpoints to a broader understanding, identifying gaps and strengths related to public use of urban spaces, infrastructure, and other factors. However, it is important to recognize a limitation of this study: the data collection relied on electronic services provided via universities and cultural institutes, which may have inadvertently excluded segments of the population from diverse social contexts. Future research should aim to create inclusive tools and criteria that engage a broader range of social groups experiencing various boundary conditions. In conclusion, the study yields several observations:

- Future research should incorporate real-time comparisons between actual pollution data and citizens' perceptions, potentially through a smartphone application that allows daily feedback on air quality from different city areas.
- The representativeness of the sample is crucial, as achieving a sample that accurately reflects the demographic and socioeconomic diversity of the local community remains challenging.
- Internet access limitations affect participation, as not all citizens have access to the digital technologies needed to complete online questionnaires, thereby excluding some population segments.
- Measures should be taken to balance different groups in data analysis in order to avoid unrepresentative or biased conclusions.

Addressing these critical issues and implementing appropriate solutions could lead to the development of a model for assessing citizens' satisfaction with air quality. Promoting awareness, enhancing environmental education, and aligning citizens' needs with their

perceptions of pollution sources can encourage local authorities to undertake more effective and concrete collaborative planning initiatives.

Author Contributions: Conceptualization, O.S.; methodology, O.S.; software, O.S.; validation, O.S., F.P., G.Č. and M.T.B.-R.; formal analysis, O.S.; investigation, O.S.; resources, O.S.; data curation, O.S. and M.T.B.-R.; writing—original draft preparation, O.S.; writing—review and editing, O.S., G.Č., M.T.B.-R. and F.P.; visualization, M.T.B.-R.; supervision, M.T.B.-R., F.P. and G.Č.; project administration, O.S.; funding acquisition, O.S. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by Slovenian Research and Innovation Agency through the Research Programme "Geoinformation infrastructure and sustainable spatial development of Slovenia," No. P2-0227. This research was conducted as part of the PA-MAP Project, which has received funding from the European Union's Horizon 2020 research and innovation program under Marie Skłodowska-Curie grant agreement No. 945380-EUTOPIA.

Data Availability Statement: The raw data supporting the conclusions of this article will be made available by the authors upon request.

Acknowledgments: The authors thank the interviewees of the two cities involved in the survey.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. *World Health Statistics 2021: Monitoring Health for the SDGs, Sustainable Development Goals*; World Health Organization: Geneva, Switzerland, 2021.
2. WHO Global Air Quality Guidelines. *Particulate Matter (PM2.5 and PM10), Ozone, Nitrogen Dioxide, Sulfur Dioxide and Carbon Monoxide*; World Health Organization: Geneve, Switzerland, 2021.
3. Duan, R.; Hao, K.; Yang, T. Air pollution and chronic obstructive pulmonary disease. *Chronic Dis. Transl. Med.* **2020**, *6*, 260–269. [CrossRef] [PubMed] [PubMed Central]
4. Cohen, A.J.; Brauer, M.; Burnett, R.; Anderson, H.R.; Frostad, J.; Estep, K.; Balakrishnan, K.; Brunekreef, B.; Dandona, L.; Dandona, R.; et al. Estimates and 25-year trends of the global burden of disease attributable to ambient air pollution: An analysis of data from the Global Burden of Diseases Study 2015. *Lancet* **2017**, *389*, 1907–1918. [CrossRef] [PubMed]
5. Huang, J.; Pan, X.; Guo, X.; Li, G. Health impact of China's Air Pollution Prevention and Control Action Plan: An analysis of national air quality monitoring and mortality data. *Lancet Planet Health* **2018**, *2*, e313–e323. [CrossRef]
6. Hermayurisca, F.; Taneepanichskul, N. Estimation of premature death attributed to short-and long-term PM2.5 exposure in Thailand. *Environ. Monit. Assess.* **2023**, *195*, 1176. [CrossRef]
7. Gilardi, L.; Marconcini, M.; Metz-Marconcini, A.; Esch, T.; Erbertseder, T. Long-term exposure and health risk assessment from air pollution: Impact of regional scale mobility. *Int. J. Health Geogr.* **2023**, *22*, 11. [CrossRef]
8. Koch, S.; Hoffmann, C.; Caseiro, A.; Ledebur, M.; Menk, M.; von Schneidemesser, E. Air quality in Germany as a contributing factor to morbidity from COVID-19. *Environ. Res.* **2022**, *214*, 113896. [CrossRef]
9. Sokhi, R.S.; Moussiopoulos, N.; Baklanov, A.; Bartzis, J.; Coll, I.; Finardi, S.; Friedrich, R.; Geels, C.; Grönholm, T.; Halenka, T.; et al. Advances in air quality research—Current and emerging challenges. *Atmospheric Meas. Technol.* **2022**, *22*, 4615–4703. [CrossRef]
10. Priti, K.; Kumar, P. A critical evaluation of air quality index models (1960–2021). *Environ. Monit. Assess.* **2022**, *194*, 324. [CrossRef]
11. Wong, C.M.; Vichit-Vadakan, N.; Vajanapoom, N.; Ostro, B.; Thach, T.Q.; Chau, P.Y.; Chan, E.K.; Chung, R.Y.; Ou, C.Q.; Yang, L.; et al. Part 5. Public health and air pollution in Asia (PAPA): A combined analysis of four studies of air pollution and mortality. *Res. Rep. Health Eff. Inst.* **2010**, *154*, 377–418. [PubMed]
12. Yen, I.H.; Yelin, E.H.; Katz, P.; Eisner, M.D.; Blanc, P.D.; Yen, I.H.; Yelin, E.H.; Katz, P.; Eisner, M. Perceived neighborhood problems and quality of life, physical functioning, and depressive symptoms among adults with Asthma. *Am. J. Public Health* **2006**, *96*, 873–879. [CrossRef]
13. Improving the Smart Control of Air Pollution in Europe. Available online: https://www.iscapeproject.eu (accessed on 11 August 2024).
14. ESCAPE Publications. Available online: https://projectescape.eu/escape-publications (accessed on 11 August 2024).
15. Open-air Laboratories for Nature Based Solutions to Manage Hydro-Meteo Risks. Available online: https://www.operandum-project.eu/ (accessed on 11 August 2024).
16. Zhu, J.; Lu, C. Air Quality, Pollution Perception, and Residents' Health: Evidence from China. *Toxics* **2023**, *11*, 591. [CrossRef] [PubMed]
17. Canha, N.; Justino, A.R.; Gamelas, C.A.; Almeida, S.M. Citizens' Perception on Air Quality in Portugal—How Concern Motivates Awareness. *Int. J. Environ. Res. Public Health* **2022**, *19*, 12760. [CrossRef] [PubMed]
18. Bruce, N.; Perez-Padilla, R.; Albalak, R. Indoor air pollution in developing countries: A major environmental and public health challenge. *Bull. World Health Organ.* **2000**, *78*, 1078–1092. [PubMed] [PubMed Central]

19. Gordon, S.B.; Bruce, N.G.; Grigg, J.; Hibberd, P.L.; Kurmi, O.P.; Lam, K.B.; Mortimer, K.; Asante, K.P.; Balakrishnan, K.; Balmes, J.; et al. Respiratory risks from household air pollution in low- and middle-income countries. *Lancet Respir. Med.* **2014**, *2*, 823–860. [CrossRef] [PubMed] [PubMed Central]
20. Liu, H.; Hu, T. How does air quality affect residents life satisfaction? Evidence based on multiperiod follow-up survey data of 122 cities in China. *Environ. Sci. Pollut. Res.* **2021**, *28*, 61047–61060. [CrossRef]
21. Nali, C.; Lorenzini, G. Air quality survey carried out by schoolchildren: An innovative tool for urban planning. *Environ. Monit. Assess.* **2007**, *131*, 201–210. [CrossRef]
22. Pfleger, E.; Adrian, C.; Lutz, R.; Drexler, H. Science communication on the public health risks of air pollution: A computational scoping review from 1958 to 2022. *Arch. Public Health* **2023**, *81*, 14. [CrossRef]
23. Reames, T.G.; Bravo, M.A. People, place and pollution: Investigating relationships between air quality perceptions, health concerns, exposure, and individual-and area-level characteristics. *Environ. Int.* **2019**, *122*, 244–255. [CrossRef]
24. Noël, C.; Van Landschoot, L.; Vanroelen, C.; Gadeyne, S. The Public's Perceptions of Air Pollution: What's in a Name? *Environ. Health Insights* **2022**, *16*, 11786302221123563. [CrossRef]
25. Al-Shidi, H.K.; Ambusaidi, A.K.; Sulaiman, H. Public awareness, perceptions and attitudes on air pollution and its health effects in Muscat, Oman. *J. Air Waste Manag. Assoc.* **2021**, *71*, 1159–1174. [CrossRef]
26. Oltra, C.; Sala, R. Perception of risk from air pollution and reported behaviors: A cross-sectional survey study in four cities. *J. Risk Res.* **2018**, *21*, 869–884. [CrossRef]
27. Giannico, V.; Spano, G.; Elia, M.; D'este, M.; Sanesi, G.; Lafortezza, R. Green spaces, quality of life, and citizen perception in European cities. *Environ. Res.* **2021**, *196*, 110922. [CrossRef]
28. Maione, M.; Mocca, E.; Eisfeld, K.; Kazepov, Y.; Fuzzi, S. Public perception of air pollution sources across Europe. *Ambio* **2020**, *50*, 1150–1158. [CrossRef]
29. Gignac, F.; Righi, V.; Toran, R.; Errandonea, L.P.; Ortiz, R.; Nieuwenhuijsen, M.; Creus, J.; Basagaña, X.; Balestrini, M. Co-creating a local environmental epidemiology study: The case of citizen science for investigating air pollution and related health risks in Barcelona, Spain. *Environ. Health* **2022**, *21*, 11. [CrossRef]
30. Fu, J.; Fu, H.; Zhu, C.; Sun, Y.; Cao, H.; Deng, X. The impact of air pollution on residents health in China: The mediating effect of population migration. *Air Qual. Atmos. Health* **2024**, *17*, 1281–1293. [CrossRef]
31. Tankosic', J.V. Environmental policy and air quality standards of the European Union. *J. Agron. Technol. Eng. Manag.* **2023**, *5*, 818–825. [CrossRef]
32. Karavas, Z.; Karayannis, V.; Moustakas, K. Comparative study of air quality indices in the European Union towards adopting a common air quality index. *Energy Environ.* **2021**, *32*, 959–980. [CrossRef]
33. OECD. *OECD Environmental Performance Review: Ireland 2021. OECD Environmental Performance Reviews*; OECD Publishing: Paris, France, 2021. [CrossRef]
34. MATTM. *Environmental Challenges, Summary of the State of the Environment in Italy*; MATTM: Rome, Italy, 2009.
35. Padano Accord. Available online: https://www.salute.gov.it/imgs/C_17_notizie_1473_listaFile_itemName_0_file.pdf (accessed on 11 August 2024).
36. Open Street Map Data. Available online: https://www.openstreetmap.org/#map=6/40.007/-2.488 (accessed on 11 August 2024).
37. Deserti, M.; Raffaelli, K.; Ramponi, L.; Carbonara, C.; Agostini, C.; Amorati, R.; Arvani, B.; Giovannini, G.; Maccaferri, S.; Poluzzi, V.; et al. COVID-19 and Air Quality in the Po Valley. Life Prep-Air: Emilia-Romagna Region, Italy, 2020.
38. Padoan, E.; Ajmone-Marsan, F.; Querol, X.; Amato, F. An empirical model to predict road dust emissions based on pavement and traffic characteristics. *Environ. Pollut.* **2018**, *237*, 713–720. [CrossRef]
39. Sustainable Movement and Transport. Available online: https://www.nationaltransport.ie/wp-content/uploads/2023/02/2022-NTA-Customer-Satisfaction.pdf (accessed on 1 March 2023).
40. Available online: https://www.dublincity.ie/sites/default/files/2022-12/Final%201-08%20Sus%20Mov.pdf (accessed on 6 November 2022).
41. Citizen Survey Report Dublin's Night-Time Economy. Available online: https://www.dublincity.ie/sites/default/files/2023-09/Executive%20Summary%20Your%20Dublin%20Your%20Voice%20Night%20Time%20Economy%20Survey%20Q3%202023.pdf (accessed on 6 November 2022).
42. Legislative Decree 196/2003. Available online: http://www.privacy.it/archivio/privacycode-en.html (accessed on 11 August 2024).
43. Legislative Decree 101/2018. Available online: https://www.gazzettaufficiale.it/eli/id/2018/09/04/18G00129/sg (accessed on 11 August 2024).
44. EU Reg. 679/2016, GDPR. Available online: https://eur-lex.europa.eu/eli/reg/2016/679/oj (accessed on 11 August 2024).
45. Turin Breathe Committee. Available online: https://www.torinorespira.it/ (accessed on 11 August 2024).
46. City of Turin, Informa Ambiente, Report 26 March 2020. Available online: http://www.comune.torino.it/ambiente/aria/aria_torino/quali-sono-le-cause-dellinquinamento-dellaria.shtml (accessed on 11 August 2024).
47. Air quality in Piedmont. Available online: https://servizi.regione.piemonte.it/catalogo/qualita-dellaria-piemonte (accessed on 5 February 2023).
48. Gallagher, J. A modeling exercise to examine variations of NOx concentrations on adjacent footpaths in a street canyon: The importance of accounting for wind conditions and fleet composition. *Sci. Total Environ.* **2016**, *550*, 1065–1074. [CrossRef]

49. Lin, C.; Ceburnis, D.; Xu, W.; Heffernan, E.; Hellebust, S.; Gallagher, J.; Huang, R.-J.; O'Dowd, C.; Ovadnevaite, J. The impact of traffic on air quality in Ireland: Insights from the simultaneous kerbside and suburban monitoring of submicron aerosols. *Atmospheric Meas. Technol.* **2020**, *20*, 10513–10529. [CrossRef]
50. Gallagher, J.; Gill, L.W.; McNabola, A. The passive control of air pollution exposure in Dublin, Ireland: A combined measurement and modelling case study. *Sci. Total Environ.* **2013**, *458–460*, 331–343. [CrossRef] [PubMed]
51. Ireland's environment: Air. Available online: https://www.epa.ie/our-services/monitoring--assessment/assessment/irelands-environment/air/ (accessed on 1 March 2023).
52. Riondato, E.; Pilla, F.; Basu, A.S.; Basu, B. Investigating the effect of trees on urban quality in Dublin by combining air monitoring with i-Tree Eco model. *Sustain. Cities Soc.* **2020**, *61*, 102356. [CrossRef]
53. Gray, S.C.; Edwards, S.E.; Schultz, B.D.; Miranda, M.L. Assessing the impact of race, social factors and air pollution on birth outcomes: A population-based study. *Environ. Health* **2014**, *13*, 4. [CrossRef]
54. Ferreira, S.; Gallagher, L. Protest responses and community attitudes toward accepting compensation to host waste disposal infrastructure. *Land Use Policy* **2010**, *27*, 638–652. [CrossRef]
55. De Titto, E.; Savino, A. Environmental and health risks related to waste incineration. *Waste Manag. Res. J. A Sustain. Circ. Econ.* **2019**, *37*, 976–986. [CrossRef] [PubMed]
56. CIVITAS Handshake. Available online: https://handshakecycling.eu/turin (accessed on 11 August 2024).
57. Bike Sharing in Dublin. Available online: https://www.dublincity.ie/residential/transportation/active-travel/initiatives/bike-sharing (accessed on 1 March 2023).
58. Sustainability Mobility Plan Introduction. Available online: http://geoportale.comune.torino.it/web/sezioni-tematiche/piano-urbano-della-mobilita-sostenibile-introduzione (accessed on 1 February 2023).
59. Forni, E.; Negro, E.; Carlucci, C.; Nasso, A.; Struppek, M. Actions against air pollution in Turin for a healthy and playable city. *Cities Health* **2019**, *3*, 53–58. [CrossRef]
60. Bena, A.; Gandini, M.; Cadum, E.; Procopio, E.; Salamina, G.; Orengia, M.; Farina, E. Risk perception in the population living near the Turin municipal solid waste incineration plant: Survey results before start-up and communication strategies. *BMC Public Health* **2019**, *19*, 483. [CrossRef] [PubMed]
61. Coi, A.; Minichilli, F.; Bustaffa, E.; Carone, S.; Santoro, M.; Bianchi, F.; Cori, L. Risk perception and access to environmental information in four areas in Italy affected by natural or anthropogenic pollution. *Environ. Int.* **2016**, *95*, 8–15. [CrossRef]
62. Bono, R.; Romanazzi, V.; Bellisario, V.; Tassinari, R.; Trucco, G.; Urbino, A.; Cassardo, C.; Siniscalco, C.; Marchetti, P.; Marcon, A. Air pollution, aeroallergens and admissions to pediatric emergency room for respiratory reasons in Turin, northwestern Italy. *BMC Public Health* **2016**, *16*, 722. [CrossRef] [PubMed] [PubMed Central]
63. Marchetti, P.; Miotti, J.; Locatelli, F.; Antonicelli, L.; Baldacci, S.; Battaglia, S.; Bono, R.; Corsico, A.; Gariazzo, C.; Maio, S.; et al. Long-term residential exposure to air pollution and risk of chronic respiratory diseases in Italy: The BIGEPI study. *Sci. Total Environ.* **2023**, *884*, 163802. [CrossRef] [PubMed]
64. Faustini, A.; Stafoggia, M.; Colais, P.; Berti, G.; Bisanti, L.; Cadum, E.; Cernigliaro, A.; Mallone, S.; Scarnato, C.; Forastiere, F. Air pollution and multiple acute respiratory outcomes. *Eur. Respir. J.* **2013**, *42*, 304–313. [CrossRef] [PubMed]
65. De Donno, A.; De Giorgi, M.; Bagordo, F.; Grassi, T.; Idolo, A.; Serio, F.; Ceretti, E.; Feretti, D.; Villarini, M.; Moretti, M.; et al. Health Risk Associated with Exposure to PM_{10} and Benzene in Three Italian Towns. *Int. J. Environ. Res. Public Health* **2018**, *15*, 1672. [CrossRef] [PubMed] [PubMed Central]
66. Natale, P.; Grosa, M.M. Air pollution trends in the town of Turin in the years 1973–1986. *Sci. Total Environ.* **1992**, *120*, 271–280. [CrossRef]