

# Determinants of Public Attitudes and Support Toward Air Pollution Prevention: A Conceptual Framework

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**Abstract:** *Air pollution prevention is a critical global priority due to its profound implications for public health, environmental sustainability, and policy effectiveness. While regulatory and technological measures are essential, the success of air pollution prevention increasingly depends on public engagement and societal dynamics. This paper develops a conceptual framework to explain how public perceptions, public attitudes, and public support interact to influence air pollution prevention. The framework posits that public perceptions shape air pollution prevention both directly and indirectly through public attitudes, while public support moderates the strength of these relationships by conditioning the translation of perceptions and attitudes into preventive outcomes. By integrating mediation and moderation mechanisms into a unified model, the study addresses fragmentation in existing research that often examines these constructs in isolation. The proposed framework advances theoretical understanding of air pollution prevention as a socially embedded process and provides a foundation for future empirical research and policy interventions aimed at strengthening public engagement and enhancing the effectiveness of air pollution prevention strategies.*

**Keywords:** Air pollution prevention; Public perceptions; Public attitudes; Public support; Environmental policy.

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## 1. Introduction

Air pollution is widely recognized as one of the most pressing environmental and public health challenges of the twenty-first century, with far-reaching consequences for human health, ecosystems, and socioeconomic development. Urbanization, industrial expansion, and increased energy consumption have intensified exposure to harmful air pollutants, prompting governments to introduce a range of preventive and regulatory measures. However, the success of air pollution prevention initiatives depends not only on technological solutions or regulatory enforcement but also on public engagement and societal acceptance of preventive actions and policies (Jonidi Jafari et al., 2021). Recent developments in environmental governance highlight the central role of the public in shaping environmental policy outcomes. Effective governance increasingly relies on public participation, transparency, and legitimacy, as environmental regulations require broad societal support to ensure compliance and long-term sustainability (Evans & Thomas, 2023). In this context, air pollution prevention cannot be understood solely as a technical or administrative process but rather as a socially embedded phenomenon influenced by how individuals and communities perceive environmental risks and respond to policy interventions.

Public perceptions of air pollution play a critical role in shaping responses to environmental hazards. Individuals' understanding of pollution sources, perceived severity of exposure, and

awareness of associated health risks influence how air pollution is prioritized relative to other societal concerns (Maione et al., 2021). Qualitative and quantitative research has shown that differences in perceived risk and personal exposure experiences significantly affect public concern and engagement with air quality issues (Noel et al., 2021). These perceptions are further shaped by lived experiences, local environmental conditions, and socio-demographic characteristics, which together form the cognitive foundation for environmental decision-making (Zhou et al., 2021). While perceptions are essential, they do not automatically translate into preventive outcomes. Public attitudes represent a more evaluative dimension that reflects individuals' judgments about the importance, desirability, and effectiveness of air pollution prevention efforts. Attitudes toward environmental issues are influenced by environmental awareness, values, and social contexts, and they play a pivotal role in shaping support for regulatory measures and behavioral change (Wittenberg et al., 2023). Empirical evidence suggests that individuals with more positive environmental attitudes are more likely to endorse preventive policies and engage in environmentally responsible actions (DeVille et al., 2021). Consequently, attitudes are increasingly viewed as a key mechanism linking perceptions of environmental risk to policy-relevant outcomes (Shen et al., 2024).

Beyond individual attitudes, public support represents a crucial contextual factor influencing the implementation and effectiveness of air pollution prevention initiatives. Public support reflects the willingness of citizens to accept, legitimize, and sustain environmental policies, including regulations that may impose behavioral or economic constraints. Strong public support has been shown to enhance policy durability and governmental commitment to environmental regulation (Drews, 2021). Conversely, limited public support can undermine enforcement efforts and weaken the political feasibility of preventive measures, even when environmental risks are widely acknowledged (Bergquist et al., 2022). Despite growing scholarly attention to public perceptions, attitudes, and support in environmental research, existing studies often examine these constructs in isolation or focus on direct relationships without considering more complex mechanisms.

There remains a lack of integrative conceptual frameworks that explain how public perceptions influence air pollution prevention through attitudinal processes while accounting for the conditional role of public support. Recent conceptual work in environmental policy and public health has emphasized the need for models that incorporate mediation and moderation mechanisms to better capture the dynamics of public engagement in environmental governance (Mudu et al., 2023). In response to these gaps, this paper develops a conceptual framework that explains the relationships among public perceptions, public attitudes, public support, and air pollution prevention. Specifically, the framework proposes that public attitudes mediate the relationship between public perceptions and air pollution prevention, while public support moderates the strength of these relationships. By offering an integrated conceptual model, this study contributes to the literature on environmental policy and public health by clarifying the psychological and social pathways through which public engagement shapes air pollution prevention outcomes.

## **2. Theoretical Foundations**

### **2.1 Air Pollution Prevention**

Air pollution prevention refers to the set of policies, regulatory instruments, and preventive actions aimed at reducing emissions at the source and minimizing population exposure to harmful air pollutants. Prevention strategies encompass regulatory controls, technological interventions, urban planning measures, and behavioral initiatives designed to limit pollution

generation before adverse health and environmental outcomes occur. Systematic reviews of air pollution control policies indicate that prevention effectiveness is strongly influenced by governance structures, regulatory design, and societal acceptance of preventive measures (Jonidi Jafari et al., 2021). From a governance perspective, air pollution prevention is increasingly viewed as a multidimensional process that extends beyond technical regulation to include social, institutional, and behavioral dimensions. Environmental governance literature emphasizes that preventive policies require legitimacy and public cooperation to achieve sustained impact, particularly in urban and industrial contexts where policy compliance is critical (Evans & Thomas, 2023). Conceptual policy frameworks further highlight that prevention outcomes are shaped by how policies are interpreted, accepted, and supported by the public, rather than by regulatory design alone (Meckling & Strecker, 2023).

## **2.2 Public Perceptions**

Public perceptions of air pollution reflect individuals' cognitive assessments of pollution sources, exposure levels, and associated health and environmental risks. These perceptions are shaped by personal experiences, environmental conditions, media communication, and socio-cultural contexts. Comparative studies across European countries demonstrate that public understanding of pollution sources varies substantially, influencing how individuals interpret responsibility and urgency for preventive action (Maione et al., 2021). Research on health risk perception further indicates that individuals' perceived vulnerability and awareness of pollution-related health impacts play a decisive role in shaping environmental concern. Qualitative reviews show that perceived uncertainty, invisibility of pollutants, and trust in information sources significantly affect how air pollution risks are understood by the public (Noel et al., 2021). Empirical studies among different population groups also suggest that direct or indirect exposure experiences intensify perceived risk and heighten sensitivity to air quality issues (Zhou et al., 2021). Public perceptions therefore constitute a foundational cognitive layer in environmental decision-making. Perception-based evaluations influence whether air pollution is recognized as a serious societal problem and whether preventive interventions are considered necessary or justified (Fan et al., 2022). As such, perceptions serve as a critical antecedent shaping downstream attitudinal and policy-related responses.

## **2.3 Public Attitudes**

Public attitudes represent individuals' evaluative orientations toward environmental issues and preventive actions. In the context of air pollution, attitudes reflect judgments about the importance of prevention, the acceptability of regulatory measures, and the perceived balance between environmental protection and economic or lifestyle considerations. Conceptual analyses of environmental attitudes emphasize that attitudes are multidimensional constructs shaped by knowledge, values, and contextual factors (Wittenberg et al., 2023). Empirical evidence consistently shows that favorable environmental attitudes are associated with stronger endorsement of environmental policies and higher willingness to engage in pro-environmental behaviors. Studies examining environmental learning and awareness demonstrate that positive attitudes facilitate receptivity to environmental information and strengthen commitment to preventive action (Baierl et al., 2022). Furthermore, exposure to supportive socio-physical environments has been shown to reinforce environmental attitudes and promote sustained behavioral engagement (DeVille et al., 2021). Attitudes also play an important explanatory role as mediating mechanisms in environmental models. Recent mediation-focused studies indicate that attitudes often translate cognitive risk perceptions and environmental knowledge into policy-relevant outcomes, thereby bridging the gap between awareness and action (Shen et al.,

2024). This mediating function positions public attitudes as a central construct in understanding how perceptions influence air pollution prevention.

## **2.4 Public Support**

Public support refers to the degree to which individuals and communities are willing to endorse, legitimize, and sustain environmental policies and preventive interventions. Support encompasses acceptance of regulatory measures, willingness to comply with environmental rules, and readiness to tolerate associated costs or behavioral adjustments. Conceptual discussions in environmental sociology underline that public support is a cornerstone of effective climate and environmental policy implementation (Drews, 2021). Empirical research demonstrates that public support significantly influences governmental decision-making and policy strength. Meta-analytic evidence shows that policy acceptability, perceived fairness, and trust in institutions are among the strongest determinants of public opinion regarding environmental regulations (Bergquist et al., 2022). Studies measuring support for clean air targets further reveal that public backing varies depending on policy framing and perceived policy effectiveness (Huang et al., 2025). Public support also functions as a contextual condition that shapes the effectiveness of attitudinal and perceptual influences on prevention outcomes. Theoretical frameworks suggest that even when individuals hold favorable attitudes, weak public support can constrain policy implementation, whereas strong support can amplify the translation of attitudes into preventive action (Gugushvili & Otto, 2023). Accordingly, public support is conceptualized in this study as a moderating factor within the broader framework of air pollution prevention.

## **3. Hypotheses Development**

### **3.1 Public Perceptions and Air Pollution Prevention**

Public perceptions of air pollution constitute a critical cognitive foundation shaping societal responses to environmental risks. When individuals perceive air pollution as severe, harmful, or personally relevant, they are more likely to recognize the necessity of preventive measures and policy interventions. Research on air pollution control policies suggests that public acknowledgment of pollution sources and risks increases societal readiness to support and engage with preventive initiatives (Jonidi Jafari et al., 2021). Moreover, evidence indicates that heightened awareness of pollution-related health impacts strengthens public expectations for regulatory action and preventive governance (Fan et al., 2022). These findings suggest that public perceptions directly influence the effectiveness and adoption of air pollution prevention efforts.

**H1:** Public perceptions have a significant effect on air pollution prevention.

### **3.2 Public Perceptions and Public Attitudes**

Public perceptions play a pivotal role in shaping public attitudes toward environmental issues. Perceived exposure to air pollution and awareness of its sources influence evaluative judgments regarding the seriousness of the problem and the desirability of preventive action. Comparative research across European contexts demonstrates that differences in perceived pollution sources are closely associated with variations in environmental concern and attitudinal responses (Maione et al., 2021). Qualitative evidence further indicates that individuals who perceive higher levels of health risk tend to develop more critical and prevention-oriented environmental

attitudes (Noel et al., 2021). These insights support the view that perceptions of air pollution serve as antecedents to the formation of public attitudes.

**H2:** Public perceptions have a significant effect on public attitudes.

### **3.3 Public Attitudes and Air Pollution Prevention**

Public attitudes represent evaluative orientations that influence how individuals respond to environmental policies and preventive actions. Positive environmental attitudes have been consistently linked to greater acceptance of regulatory measures and stronger engagement in pro-environmental behavior. Conceptual analyses of environmental attitudes emphasize that favorable attitudes enhance receptivity to environmental policies and increase willingness to endorse preventive interventions (Wittenberg et al., 2023). Empirical studies further demonstrate that supportive attitudes toward environmental protection are associated with increased compliance and participation in pollution control initiatives (Nguyen et al., 2021). Accordingly, public attitudes are expected to play a direct role in shaping air pollution prevention outcomes.

**H3:** Public attitudes have a significant effect on air pollution prevention.

### **3.4 The Mediating Role of Public Attitudes**

While public perceptions are essential for recognizing environmental risks, they do not automatically lead to preventive outcomes. Public attitudes provide a critical psychological mechanism through which perceptions are translated into action and policy-relevant responses. Mediation-focused research indicates that environmental attitudes often bridge the gap between risk perception and behavioral or policy outcomes by transforming cognitive awareness into evaluative commitment (Shen et al., 2024). Studies examining environmental knowledge and awareness similarly suggest that attitudes function as an intermediary variable that channels perceptual inputs into preventive engagement (Bala et al., 2023). This theoretical and empirical evidence supports the mediating role of public attitudes in the relationship between public perceptions and air pollution prevention.

**H4:** Public attitudes mediate the relationship between public perceptions and air pollution prevention.

### **3.5 The Moderating Role of Public Support between Public Attitudes and Air Pollution Prevention**

Public support represents a broader social and political context that can strengthen or weaken the influence of individual attitudes on preventive outcomes. Even when individuals hold favorable attitudes toward environmental protection, the translation of these attitudes into effective prevention may depend on the extent of collective support for environmental policies. Conceptual discussions of environmental policy implementation emphasize that strong public support enhances policy legitimacy and facilitates the conversion of favorable attitudes into sustained preventive action (Drews, 2021). Empirical evidence further suggests that public endorsement of environmental regulations amplifies the impact of attitudinal factors on policy effectiveness (Kaiser et al., 2023). Thus, public support is expected to condition the relationship between public attitudes and air pollution prevention.

**H5:** Public support moderates the relationship between public attitudes and air pollution prevention.

### **3.6 The Moderating Role of Public Support between Public Perceptions and Air Pollution Prevention**

Public support may also influence the extent to which public perceptions directly affect air pollution prevention. While heightened perceptions of environmental risk can increase demand for preventive measures, the actual realization of prevention outcomes often depends on societal willingness to legitimize and sustain policy action. Research on public opinion and environmental regulation shows that strong public backing can encourage governments to adopt and enforce more robust environmental policies (Chai et al., 2024). Conversely, weak public support may constrain the policy impact of risk perceptions, limiting the translation of concern into prevention. This suggests that public support moderates the relationship between public perceptions and air pollution prevention.

**H6:** Public support moderates the relationship between public perceptions and air pollution prevention.

## **4. Gap in the Literature**

### **4.1 Gaps in Research on Public Perceptions and Air Pollution Prevention**

Existing research has made substantial progress in examining how the public perceives air pollution, particularly with respect to pollution sources, exposure, and health risks. Studies across different geographical contexts demonstrate that public perceptions vary widely and are shaped by local environmental conditions, personal experiences, and socio-cultural factors (Maione et al., 2021). Qualitative reviews further highlight that public understanding of air pollution risks is often fragmented, influenced by uncertainty, and mediated by trust in information sources (Noel et al., 2021). While these studies provide valuable insights into how air pollution is perceived, they largely focus on perception as an outcome rather than as a determinant of prevention-oriented processes. Moreover, much of the existing literature treats public perceptions as isolated explanatory variables without explicitly linking them to broader air pollution prevention mechanisms. Empirical research frequently emphasizes awareness and risk perception but does not sufficiently examine how these perceptions translate into preventive policy adoption or sustained prevention efforts (Fan et al., 2022). As a result, there remains a conceptual gap in understanding how public perceptions function within a broader causal chain that connects cognitive awareness to prevention outcomes.

### **4.2 Gaps in Research on Public Attitudes and Air Pollution Prevention**

Research on public attitudes toward environmental issues has consistently demonstrated their importance in shaping environmental behavior and policy acceptance. Conceptual work emphasizes that environmental attitudes are multidimensional constructs influenced by knowledge, values, and contextual conditions (Wittenberg et al., 2023). Empirical studies further show that positive environmental attitudes are associated with stronger engagement in pro-environmental behavior and greater receptivity to environmental regulation (DeVilje et al., 2021). Despite this, the specific role of public attitudes in air pollution prevention remains underdeveloped. A key limitation of existing studies is the tendency to examine attitudes primarily as direct predictors of behavior or policy support, without adequately considering their intermediary role. Recent mediation-oriented research suggests that attitudes often serve

as a psychological bridge between risk perception and environmental outcomes (Shen et al., 2024). However, this mediating function has not been sufficiently theorized or integrated into air pollution prevention frameworks, leaving a gap in understanding how attitudes translate perceptual inputs into preventive action.

### **4.3 Gaps in Research on Public Support and Air Pollution Prevention**

Public support has been widely acknowledged as a crucial factor in the success of environmental and climate policies. Conceptual discussions in environmental sociology emphasize that policy effectiveness depends heavily on public endorsement, legitimacy, and acceptance (Drews, 2021). Meta-analytic evidence further demonstrates that public opinion plays a decisive role in shaping the adoption and strength of environmental regulations (Bergquist et al., 2022). Nevertheless, research on public support in the context of air pollution prevention remains conceptually limited. Most existing studies treat public support as an outcome variable, focusing on levels of acceptance or opposition to specific policies. While such approaches are valuable, they overlook the potential role of public support as a contextual condition that influences how other factors operate. Comparative theoretical work suggests that public support can condition the effectiveness of environmental attitudes and perceptions, yet this moderating role has rarely been explicitly examined within air pollution prevention research (Gugushvili & Otto, 2023). This represents a significant gap in the literature.

### **4.4 Integrated Gaps Addressed by the Conceptual Model**

Taken together, the existing literature reveals a fragmented understanding of the relationships among public perceptions, public attitudes, public support, and air pollution prevention. Research on public perceptions tends to emphasize awareness and risk assessment without embedding these constructs within broader prevention-oriented models. Studies on public attitudes often neglect their mediating role between perception and prevention, while research on public support frequently overlooks its potential to condition or moderate these relationships. Recent conceptual frameworks in public health and environmental policy have called for integrative models that capture mediation and moderation mechanisms to better explain public engagement in environmental governance (Mudu et al., 2023). However, such integrative approaches remain scarce in the context of air pollution prevention. To address these gaps, the present study develops a conceptual framework that positions public attitudes as a mediating mechanism between public perceptions and air pollution prevention, while conceptualizing public support as a moderating factor that shapes the strength of these relationships. By integrating these constructs into a unified model, the proposed framework advances theoretical understanding and provides a foundation for future empirical investigation.

## **5. Conceptual Framework Development**

### **5.1 Conceptual Relationships among Public Perceptions, Attitudes, and Support**

The proposed conceptual framework is grounded in the premise that air pollution prevention is shaped by interconnected cognitive, evaluative, and contextual processes within society. Public perceptions represent the cognitive dimension through which individuals recognize air pollution, identify its sources, and assess its potential risks. These perceptions form the initial basis upon which individuals evaluate the seriousness of air pollution and the necessity of preventive actions. Research on public understanding of pollution sources demonstrates that perception is a key precursor to subsequent evaluative and policy-oriented responses (Maione

et al., 2021). Public attitudes constitute the evaluative dimension of the framework, reflecting individuals' judgments about the importance and desirability of air pollution prevention. Attitudes are shaped by perceptual inputs, personal values, and broader social influences, and they influence how individuals respond to environmental policies and preventive measures. Conceptual work on environmental attitudes emphasizes that attitudes play a central role in translating environmental awareness into meaningful engagement with environmental issues (Wittenberg et al., 2023). Public support represents the broader social and political context within which perceptions and attitudes operate. Support reflects collective endorsement of environmental policies and preventive interventions and contributes to policy legitimacy and sustainability. Studies on environmental policy acceptance suggest that public support is essential for ensuring that preventive measures are implemented effectively and maintained over time (Drews, 2021). Together, public perceptions, attitudes, and support form a dynamic system through which air pollution prevention is socially constructed and operationalized.

### **5.2 Mediation Mechanism of Public Attitudes**

Within the proposed framework, public attitudes are conceptualized as a mediating mechanism linking public perceptions to air pollution prevention. While perceptions enable individuals to recognize environmental risks, they do not necessarily lead directly to preventive outcomes. Attitudes provide an interpretive layer that transforms cognitive awareness into evaluative commitment, thereby influencing the likelihood of preventive action. Evidence from mediation-oriented environmental research indicates that attitudes frequently act as psychological conduits through which risk perceptions and environmental knowledge influence policy-relevant outcomes. Studies examining the translation of health risk perception into environmental behavior demonstrate that attitudes play a critical intermediary role in shaping responses to environmental challenges (Shen et al., 2024). Similarly, research on environmental knowledge formation suggests that attitudes are necessary for converting awareness into sustained engagement with preventive initiatives (Bala et al., 2023). Accordingly, the framework positions public attitudes as a central mechanism through which public perceptions affect air pollution prevention.

### **5.3 Moderation Mechanism of Public Support**

In addition to mediation, the framework incorporates public support as a moderating mechanism that conditions the strength of relationships within the model. Even when individuals perceive air pollution as a serious problem and hold favorable attitudes toward prevention, the translation of these orientations into effective prevention outcomes may depend on the broader level of societal support for environmental policies. Theoretical discussions in environmental sociology highlight that strong public support enhances policy legitimacy and enables governments to implement more robust preventive measures. Empirical evidence further suggests that public endorsement can amplify the impact of individual attitudes on policy outcomes by creating a supportive environment for regulatory enforcement (Kaiser et al., 2023). Conversely, weak public support may constrain the effectiveness of prevention efforts, limiting the influence of perceptions and attitudes on policy implementation. Research on public opinion and environmental regulation indicates that societal backing plays a decisive role in determining whether environmental concerns are translated into concrete preventive action (Chai et al., 2024). Thus, public support is conceptualized as a moderating factor that strengthens or weakens the pathways linking perceptions and attitudes to air pollution prevention.

### 5.4 Proposed Conceptual Framework

Based on the preceding theoretical arguments, the proposed conceptual framework integrates public perceptions, public attitudes, public support, and air pollution prevention into a unified model. The framework posits that public perceptions exert both direct and indirect effects on air pollution prevention, with public attitudes mediating this relationship. Furthermore, public support is proposed to moderate the relationships between public perceptions and air pollution prevention, as well as between public attitudes and air pollution prevention. By incorporating both mediation and moderation mechanisms, the framework advances existing literature by offering a more comprehensive explanation of how public engagement influences air pollution prevention. The model responds to calls for integrative conceptual approaches in environmental policy and public health research by explicitly accounting for cognitive, evaluative, and contextual dimensions of public involvement (Mudu et al., 2023). Figure 1 illustrates the proposed relationships and serves as a foundation for future empirical testing and policy-oriented analysis.

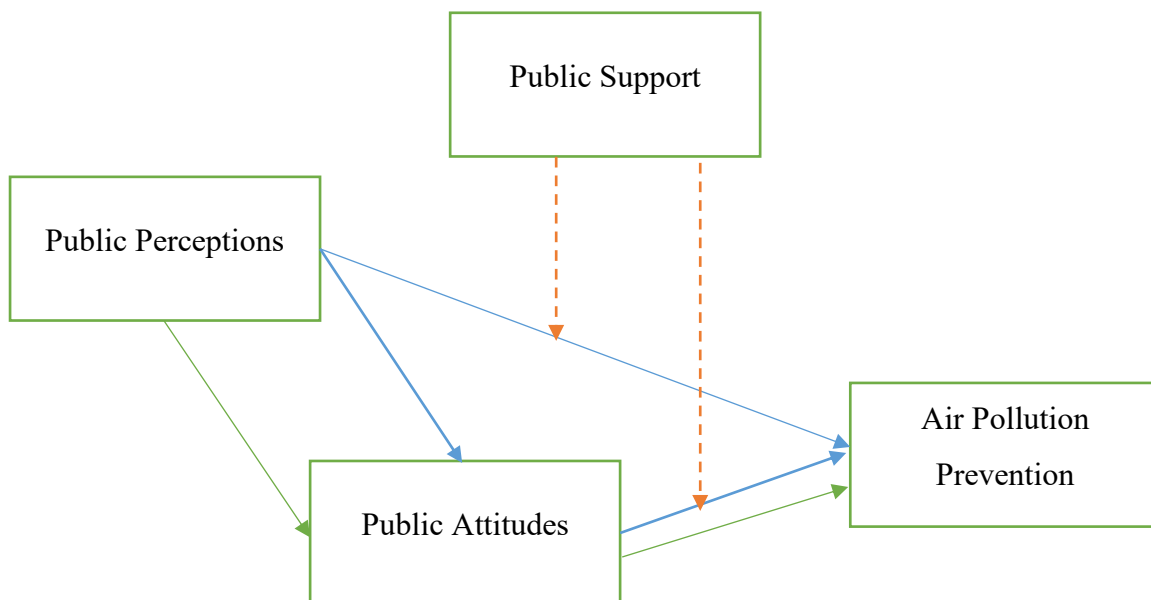


Figure1. Conceptual Framework

## 6. Implications

### 6.1 Policy and Regulatory Implications

The proposed conceptual framework offers important insights for policymakers and regulators responsible for designing and implementing air pollution prevention strategies. By highlighting the role of public perceptions as a foundational determinant, the framework underscores the importance of policies that enhance transparency and improve public understanding of pollution sources and risks. Evidence suggests that when the public clearly understands the origins and impacts of air pollution, regulatory measures are more likely to be perceived as legitimate and necessary, thereby facilitating policy acceptance (Maione et al., 2021). The framework also emphasizes that public attitudes play a crucial mediating role between perceptions and prevention outcomes. This implies that regulatory approaches should not focus

solely on information dissemination but should also address value-based and evaluative dimensions of public engagement.

Policy communication strategies that frame air pollution prevention as socially beneficial and morally justified can strengthen public attitudes and increase receptivity to regulatory interventions (Riley et al., 2021). Moreover, integrating public opinion into policy design processes may enhance alignment between regulatory objectives and societal expectations, improving the durability of prevention measures (Chai et al., 2024). Public support, as conceptualized in this study, further suggests that regulatory success depends on maintaining broad societal endorsement. Strong public backing can encourage governments to adopt more ambitious pollution control measures and sustain enforcement efforts over time. Research indicates that public support significantly shapes the scope and strength of environmental regulation, particularly in politically sensitive contexts (Bergquist et al., 2022). Therefore, policymakers should view public support not merely as an outcome but as a strategic resource that conditions regulatory effectiveness.

### **6.2 Public Health and Environmental Practice Implications**

From a public health perspective, the framework highlights the importance of aligning air pollution prevention initiatives with public perceptions and attitudes to enhance preventive effectiveness. Public health interventions aimed at reducing pollution-related health risks can benefit from addressing perceptual gaps and misinterpretations that may weaken preventive engagement. Studies tracking urban health policies emphasize that effective air pollution prevention requires coordinated efforts that integrate health communication, community engagement, and environmental planning (Mudu et al., 2023). Environmental practitioners and public health professionals can also leverage the mediating role of public attitudes by designing interventions that foster positive environmental evaluations and personal responsibility. Evidence suggests that strengthening environmental attitudes enhances individuals' willingness to engage in preventive behaviors and support collective environmental action (DeVile et al., 2021).

Additionally, initiatives that increase environmental awareness and sensitivity, particularly through education and community-based programs, may reinforce attitudinal pathways that support long-term prevention efforts (Melnik & Podorozhnyi, 2023). The moderating role of public support further indicates that practitioners should consider the broader social context in which prevention initiatives are implemented. Strong community endorsement can amplify the impact of public health interventions, while limited support may undermine their effectiveness. Research on environmental governance suggests that building trust and fostering inclusive participation are essential for sustaining public health-oriented environmental practices (Suldovsky & Frank, 2022).

### **6.3 Implications for Future Research**

The conceptual framework developed in this study provides a foundation for future empirical research on public engagement in air pollution prevention. Researchers are encouraged to empirically test the proposed relationships, particularly the mediating role of public attitudes and the moderating role of public support, across different socio-cultural and policy contexts. Studies examining environmental attitudes in context suggest that the strength and direction of these relationships may vary depending on institutional quality, governance structures, and cultural norms (Wittenberg et al., 2023). Future research may also explore the interaction between public support and policy effectiveness by examining how different forms of support influence regulatory outcomes. Comparative theoretical frameworks indicate that public

support for environmental policies is shaped by a complex interplay of social, political, and economic factors, warranting further investigation (Gugushvili & Otto, 2023). Longitudinal and cross-national studies could provide deeper insights into how changes in perceptions and attitudes over time affect the sustainability of air pollution prevention efforts. Finally, the framework invites researchers to expand its application beyond air pollution to other environmental domains where public engagement is critical. Conceptual models of pro-environmental behavior suggest that integrating cognitive, attitudinal, and contextual variables can enhance explanatory power and policy relevance across environmental challenges (Alzaidi & Iyanna, 2022). By building on the present framework, future studies can contribute to a more nuanced understanding of the social mechanisms underpinning environmental prevention and governance.

## **7. Conclusion**

This paper developed a conceptual framework to explain how public perceptions, public attitudes, and public support jointly shape air pollution prevention. By integrating cognitive, evaluative, and contextual dimensions of public engagement, the framework advances understanding of air pollution prevention as a socially embedded process rather than a purely technical or regulatory endeavor. The proposed model emphasizes that public perceptions form the initial foundation for recognizing air pollution risks, while public attitudes function as a key mechanism translating these perceptions into preventive outcomes. At the same time, public support is conceptualized as a critical contextual factor that conditions the strength of these relationships. The framework contributes to the literature by addressing fragmentation in existing research, which often examines public perceptions, attitudes, or support in isolation. By explicitly incorporating both mediation and moderation mechanisms, the model offers a more comprehensive explanation of how public engagement influences air pollution prevention. This integrative perspective responds to growing calls for conceptual approaches that capture the complexity of public involvement in environmental governance and policy implementation.

From a practical standpoint, the framework highlights the importance of considering societal dynamics when designing and implementing air pollution prevention strategies. Policies and interventions that overlook public perceptions, attitudinal processes, or levels of public support may struggle to achieve sustained effectiveness. By contrast, approaches that align preventive measures with public understanding, values, and collective endorsement are more likely to foster long-term compliance and policy durability. Overall, this study provides a theoretically grounded foundation for future empirical research and policy analysis. By clarifying the relationships among public perceptions, public attitudes, public support, and air pollution prevention, the conceptual framework offers a useful lens for examining public engagement across diverse environmental contexts. Future research may build on this framework to empirically test its proposed relationships and to extend its application to other areas of environmental prevention and governance.

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### Conflict of Interest Statement

The authors declare that there is no conflict of interest regarding the publication of this study. This research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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