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ENVIRONMENTAL AWARENESS OF YOUNG PEOPLE ABOUT AIR POLLUTION IN ALMATY: AN ANALYSIS OF MEDIA AND PUBLIC OPINION

Media, particularly social media, increasingly shape environmental awareness, especially in urban areas in which environmental issues are highly visible. However, existing research indicates that greater awareness does not necessarily lead to increased concern or more environmentally responsible behavior.

The article examines the relationship between media exposure and environmental awareness among young people in Almaty, focusing on air pollution, a major urban issue.

A mixed-method approach was used, combining survey data with media content analysis. The formal questionnaire assessed key aspects of environmental awareness, including exposure, perceptions, and concern. Media coverage of air pollution was also analyzed to find dominant frames and narratives.

The results of this research show that respondents understand and express a high level of awareness of air pollution. But this awareness does not translate into real emotional concern or behavioral intentions. Results also show that the media can set the agenda and shape perceptions of environmental risks, influencing whether they are perceived as abstract or personally relevant information.

Drawing on up-to-date empirical material, the article also addresses the underrepresentation of Central Asia in environmental communication research. It is also important to rethink the role of social media, as it is not only a source of information but also an instrument for shaping environmental perceptions and engagement.

Keywords: social media, media, environmental awareness, youth, air pollution.

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Алматы қаласындағы ауаның ластануына қатысты жастардың экологиялық хабардарлығы: медиа мен қоғамдық пікірді талдау

Экологиялық хабардарлық экологиялық мәселелер бар үлкен қалаларда бұқаралық ақпарат құралдары мен әлеуметтік желілердің ықпалымен қалыптасып келеді. Алайда қолда бар зерттеулер хабардарлықтың әрдайым алаңдаушылыққа немесе экологиялық жауапты мінез-құлыққа алып келе бермейтінін көрсетеді.

Бұл зерттеудің мақсаты – Алматы жастары арасында бұқаралық ақпарат құралдарының әсері мен экологиялық хабардарлық арасындағы байланысты зерделеу. Бұл ретте ауаның ластануы өзекті қалалық мәселе ретінде ерекше назарға алынады.

Зерттеу сауалнама деректері мен БАҚ контентін талдауды ұштастыратын аралас әдіске негізделген. Экологиялық хабардарлықтың негізгі аспектілерін, атап айтқанда ақпараттың әсерін, қабылдауды және алаңдаушылықты бағалау үшін ғылыми мақалада құрылымдалған сауалнама қолданылды. Басым медиафреймдер мен нарративтерді анықтау мақсатында жергілікті БАҚ материалдары талданды.

Нәтижелерге сәйкес, респонденттер Алматы қаласындағы ауаның ластануы туралы жақсы хабардар. Дегенмен бұл хабардарлық әрдайым жоғары эмоционалды алаңдаушылықпен байланыса бермейді және мінез-құлық ниеттерінің бар екенін әрқашан көрсетпейді. Сонымен бірге БАҚ-тың ақпаратты түсіндіру тәсілі экологиялық қатерлер мен мәселелер туралы ақпаратты қабылдауды қалыптастыруда маңызды рөл атқарады.

Бұл зерттеу экологиялық коммуникация саласындағы зерттеулерде әлі де жеткіліксіз қамтылған Орталық Азия контекстінен эмпирикалық деректер ұсына отырып, қолда бар әдебиетке өз үлесін қосады. Сондай-ақ ол әлеуметтік желілердің рөлін тек ақпарат көзі ретінде

коршаған ортаны қабылдауды және оған тартылуды қалыптастыратын негізгі фактор ретінде қайта қарастыру қажеттігін атап көрсетеді.

Түйін сөздер: әлеуметтік желілер, бұқаралық ақпарат құралдары, экологиялық сана, жастар, ауаның ластануы.

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Экологическая осведомленность молодежи о загрязнении воздуха в Алматы: анализ медиа и общественного мнения

Экологическая осведомленность все чаще формируется под влиянием СМИ и социальных сетей, особенно в городских условиях, где экологические проблемы хорошо заметны. Однако, существующие исследования показывают, что осведомленность не обязательно приводит к обеспокоенности или экологически ответственному поведению.

Цель данного исследования – изучить взаимосвязь между воздействием СМИ и экологической осведомленностью среди молодежи в Алматы, с особым акцентом на загрязнение воздуха как на актуальную городскую проблему.

Методологическую основу исследования составляет смешанный подход (mixed methods), сочетающий анкетный опрос и контент-анализ средств массовой информации. Оценка ключевых параметров экологической осведомленности – уровня информированности, специфики восприятия и степени обеспокоенности аудитории – осуществлялась с помощью структурированного опросника. С целью верификации доминирующих медиафреймов и нарративов был проведен качественный и количественный анализ материалов региональных (местных) СМИ.

Согласно результатам, респонденты хорошо осведомлены о загрязнении воздуха в городе Алматы. Но все же, эта осведомленность не всегда относится к высокой эмоциональной обеспокоенности и не всегда говорит о поведенческих намерениях. Но медийная трактовка все же играет важную роль в формировании восприятия информации о экологических рисках и проблемах.

Данное исследование вносит вклад в существующую литературу, предоставляя эмпирические данные из контекста Центральной Азии, который остается недостаточно представленным в исследованиях экологической коммуникации. Оно также подчеркивает необходимость переосмысления роли социальных сетей не только как источника информации, но и как ключевого фактора, формирующего восприятие окружающей среды и вовлеченность в нее.

Ключевые слова: социальные сети, СМИ, экологическая осознанность, молодежь, загрязнение воздуха.

Introduction

The World Health Organization classifies air pollution as a “public health emergency,” stating that approximately 99% of the global population is exposed to unsafe levels of pollutants (Contri et al., 2026).

Researchers are paying particular attention to PM2.5 particles, which, because they can penetrate deep into the lungs and bloodstream, are recognized as the most hazardous air pollutants (Pramanik et al., 2025).

A similar problem is also relevant in Central Asia, particularly in Almaty, Kazakhstan. Therefore, the study will focus on this city and young people studying at universities in Almaty. In January 2024, there were 18.19 million internet users in Kazakhstan, representing 92.3% of the country’s total population. Internet penetration is at its highest level (Kemp, 2024).

Young people have higher digital literacy, so they have the opportunity to use all the tools. As of 2025, there are 1.86 million internet users aged 18-24 in Kazakhstan. According to the Law of the Republic of Kazakhstan “On State Youth Policy,” young people are defined as individuals aged 14 to 35. Given this, young people are the largest group of social media users in Kazakhstan.

One of the key environmental issues in Almaty is air pollution. Media reports on poor air quality regularly appear, creating a persistent informational backdrop. This raises the question of the substantive context of such publications: do first- and second-order materials include practical recommendations for the public and do they promote environmentally responsible behavior?

Numerous current news items characterize Kazakhstan’s environmental agenda. Media outlets and social media regularly publish materials informing citizens about various environmental issues. Ac-

ording to Tatyana Dobrosklonskaya (2022), first-order media texts are those created by the media; second-order texts are those created by individual authors, such as bloggers, vloggers, and independent media entrepreneurs; and third-order content is personal content reflecting the opinions and experiences of users. In this context, first-order media texts serve informational, educational, and advisory functions, while second-order and third-order texts reflect public opinion and user attitudes toward the environmental agenda.

The process of building environmental awareness begins with agenda-setting. According to the classic study by McCombs & Shaw (1972), media outlets can shift the relevance of their reporting topics into the public eye, thereby determining which issues audiences consider most important. According to Entman's (1993) classical definition, it allows the formulation of a problem definition, the diagnosis of its causes, and the proposal of solutions. According to I. Goffman's (Goffman, 1974) classic approach, individuals use "primary frames" – natural and social – to answer the fundamental question "What's going on here?" and organize their everyday experiences of phenomena such as smog or air pollution (Verhoeven, 1985). Framing is a context-dependent process that occurs at the intersection of the communicator, the text, the recipient, and culture, serving as a shared "stock" of interpretive schemas available in society (Ali & Hassan, 2022).

Media and public opinion analysis requires consideration of specific "framing devices," such as metaphors, visual images, and hashtags, that make environmental information more salient and memorable to audiences (Ali & Hassan, 2022). From a methodological point of view, modern research increasingly relies on computational approaches such as topic-based modeling (LDA), the principles of which are outlined by D. Blei (Blei, 2012). An important mechanism here is "appresentation," whereby certain media signs or symbols automatically evoke in the minds of young people entire complexes of meanings already embedded in society's "available knowledge." The process of "transposition" or "keying" allows the media to transform initial events (for example, scientific data on air quality) into other frames – political or protest – radicalizing how the audience understands the essence of what is happening (Vakhshatayn, 2009). Thus, young people's awareness is formed not sim-

ply through information consumption but through the interaction of media frames with their personal experience and cultural context.

Research gap, aim and research questions

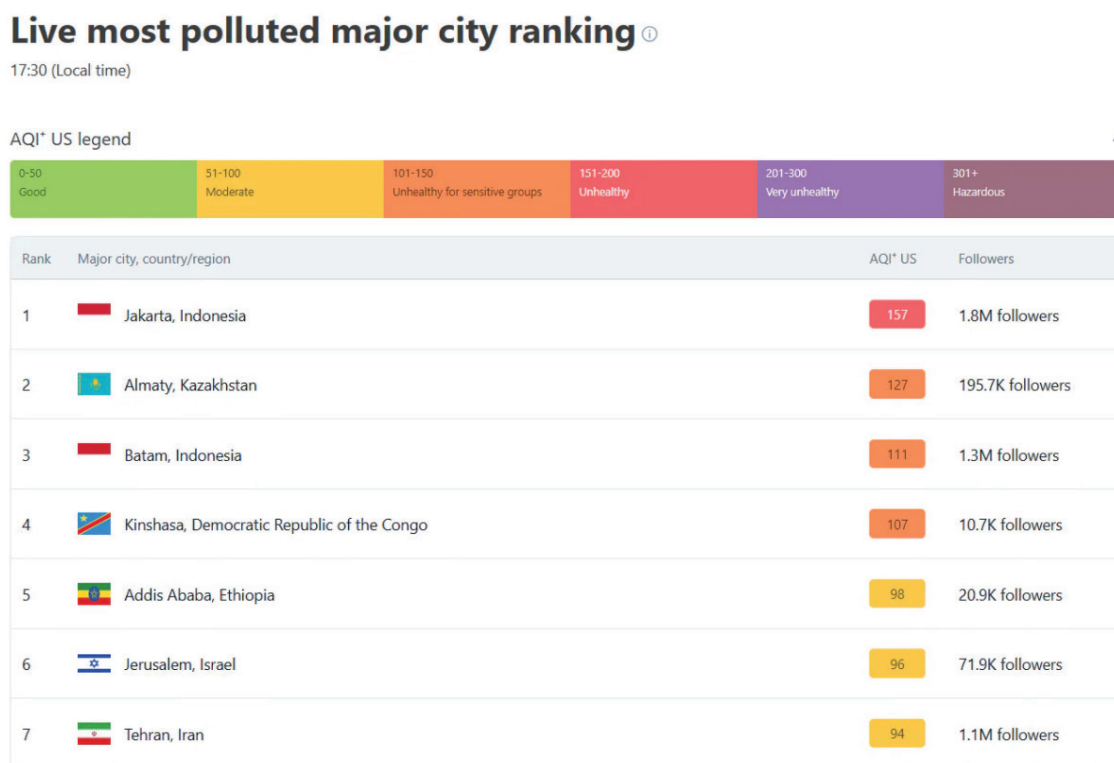
Despite a growing body of international research on environmental communication, a persistent paradox remains under-theorized: urban youth report high awareness of air pollution while exhibiting low levels of emotional concern and pro-environmental behavioral intention. This awareness-behavior gap has been documented in Western and South Asian contexts, but empirical evidence from Central Asia, and from Kazakhstan in particular, is virtually absent. Almaty – one of the world's ten most polluted cities (IQAir, 2025) and a city where 92,3% of the population is online (Kemp, 2024) – offers a uniquely informative case for examining among young people. Accordingly, this study addresses three research questions: (RQ1) How is air pollution framed in first-order media texts circulating in Almaty? (RQ2) Through which media channels and in what form do Almaty university students encounter information about air pollution? (RQ3) To what extent do these media frames generate concern and behavioral intention, rather than mere factual awareness?

Methodologically, the article rests on two complementary approaches. The first was a content analysis of Kazakhstani media publications on air pollution – first-order media texts that play a role as informational and educational. The second was a survey of Almaty students, who are among the most socially and environmentally active groups. The sample was selected using convenience sampling and included students from the city's higher education institutions, given their high engagement with digital media and sensitivity to environmental issues.

A limitation of the study is its focus on students, which means the results reflect the specific perceptions of environmental information within this group and cannot be directly generalized to all young people in Almaty.

Air pollution in Almaty is a long-term problem. In September 2025, the city ranked second globally in air pollution. Despite extreme readings recorded on September 16, the average annual PM_{2.5} concentration in 2024 was 20.3 µg/m³, corresponding to an AQI of 68 and four times higher than the World Health Organization standard (IQAir, 2025).

Figure 1
Ranking of cities by air pollution level (IQAir, 2025).



Historical data also confirms the persistence of the problem. Almaty ranked 25th in the NYC Partnership Consulting rating, an improvement over the previous year (Aimanbetova, 2010). International monitoring systems regularly record unfavorable air quality indicators in the city. According to the IQAir platform, Almaty was included in the global online ranking and, in the first days of monitoring, ranked among the leading cities for pollution levels (Tukusheva, 2024). The recorded AQI values corresponded to the unhealthy category, indicating a high level of environmental risk and highlighting the systemic nature of the problem.

Literature review

Environmental awareness is viewed as a multi-stage process of human interaction with information (Stamn, 2000). Young people in large cities such as Almaty regularly encounter media and social media reports about air pollution, but awareness alone does not guarantee a shift toward concern or action.

Within the post-Soviet space, environmental journalism has emerged as a distinct subfield only over the past decade. Recent Kazakhstani scholar-

ship has begun to map its institutional and discursive contours: Mukhamadiyeva and colleagues (2025) argue that environmental journalism in Kazakhstan is gradually shifting from event-driven crisis reporting toward a sustainability-oriented agenda, yet still suffers from limited access to expert sources, low specialization of journalists, and weak integration with the Sustainable Development Goals framework (Mukhamadiyeva et al., 2025). Earlier work likewise notes that environmental media in Kazakhstan remain reactive and centered on highly visible crises – the Aral Sea, the Semey nuclear test site, and, increasingly, urban air pollution – rather than on systemic structural drivers. These findings frame the present study: if Kazakhstani environmental journalism predominantly stays at the level of describing symptoms, it is plausible that audience awareness – particularly among the digitally exposed urban youth – will remain anchored at the same descriptive level, reproducing rather than closing the awareness-behavior gap.

Together, these approaches view environmental awareness no longer as a static state but as a dynamic, nonlinear process in which exposure to information does not necessarily lead to behavior change.

Agenda-setting theory suggests that the media play a significant role in attracting public attention to environmental issues. Audience concern is often determined by the intensity of coverage rather than the depth of message content. Consequently, public interest in environmental risks may decline as media attention decreases and the information agenda shifts (Mazur, 1993).

It's important to consider agenda-setting theory to better explain which issues attract attention. However, this theory provides only a limited understanding of how audiences interpret and amplify environmental information. This is especially true for digital and social media.

Environmental communication research emphasizes that media exposure involves several stages: initial contact with information (exposure), attention, understanding, emotional response (concern), and action readiness (Stamm, 2000). The transition between these stages is not automatic, which explains the gap between awareness and actual audience behavior.

The media not only serve an informational function but also shape the interpretive framework for perceiving environmental risks. Air pollution can be presented as a health threat, a social problem, an economic challenge, or a matter of political responsibility. These media frames determine whether the problem is perceived as an abstract or a personal risk. Research on media coverage of environmental threats shows that the media act as a mechanism for constructing public perceptions and interpreting risk (an online study of media coverage of air pollution). Environmental awareness, however, is a multi-layered structure, encompassing knowledge, understanding, and willingness to act (Stamm, 2000).

International studies demonstrate that an increase in the number of publications does not always lead to a deeper understanding of environmental issues. An analysis of Indian media revealed a concentration of attention on metropolitan areas, which limits the comprehensiveness of environmental discourse (Murukutla, 2017). In British publications, there is evidence that the public's interest in air pollution is linked to accepting information and news from conflictual media frames, which create contrasting positions and intensify public debate (Kenis & Barratt, 2021).

Existing research demonstrates that media not only inform audiences but also actively construct the meaning of environmental risks, thereby influencing whether individuals perceive these risks as distant or personally relevant.

Despite these findings, existing studies primarily focus on media production (content, framing) or aggregate public responses, with limited attention to the micro-level relationships among media exposure, perception, and behavioral intention, particularly among young urban audiences.

Methodology

To analyze the structure of public debates about air pollution in Almaty, we used the four-level typology proposed by A. Kenis and B. Barratt. The model is based on the theoretical developments of R. Jensen (2002) in the field of environmental awareness raising and is adapted to analyze discussions about air quality.

For this purpose, first-order media texts were randomly selected – that is, materials from official print and online media covering the period December 2025–January 2026. This was done using Google search filters and period settings. A total of nine media texts were selected for manual content analysis.

Further, as part of the study, a survey was conducted via Google Forms among first- to fourth-year university students at universities in Almaty. The questionnaire contained 15 questions, including two to determine demographic factors (age and gender), while the remaining questions aimed to identify environmental awareness of air pollution in Almaty among the sample. However, four outcome questions were selected for the study as they met the study's objectives and were relevant to the current agenda, describing the relationship between young people's perceptions of news coverage and air pollution, as well as the main message in primary media texts.

The questionnaire was distributed in January–February 2026 via Google Forms to undergraduate students of two Almaty-based universities through institutional student mailing lists and study-group chats of first- and second-year students – a convenience sampling strategy commonly employed in exploratory communication research where the goal is hypothesis generation rather than population-level inference. The final sample (N = 107) was composed as follows: gender – [35,5% female / 64,5% male]. The dominance of first- and second-year respondents (92.5% aged 18-20) reflects the entry-cohort structure of Kazakhstani undergraduate programs and is acknowledged as a sampling boundary (see Limitations). The questionnaire contained 15 items: two demographics, nine on media exposure and

perceptions of air-pollution coverage, and four on awareness, concern, and behavioral intention. For the present article, four items were selected as they directly operationalize the three research questions; the remaining items will be analyzed in a forthcoming companion paper.

Limitations

Because the sample is dominated by first- and second-year students and was not stratified by field of study, the present results cannot be used to compare media-literate cohorts (e.g., journalism or communication students) with technically-oriented cohorts; such a comparison is a logical next step that requires a stratified design.

Results

The problem of air pollution in Almaty has ceased to be a narrowly environmental issue and has become a central focus of public debate. To analyze the structure of these debates, we use the model by A. Kenis and B. Barratt (2021), which allows us to trace the evolution of awareness of the problem through four levels: from the recording of symptoms to the search for structural political solutions.

Level 1: Symptoms and Facts (What is Happening?)

At the first level, the debate focuses on informing citizens about the scale of the environmental crisis. In 2025, Almaty set anti-smog records: smog blanketed the city for 217 days – almost 60% of the year (Smailov, 2026). The average annual concentration of fine particulate matter (PM_{2.5}) was 31.2 µg/m³, six times higher than the WHO standard (Abdiraiym, 2026). According to the research, there is a negative trend: the air has become 30% dirtier over the past year, and the number of smoke-free days has decreased from 164 to 148 (Chechneva, 2026). And a metaphor emerged from the experts at the Almaty Air Initiative – they say that each citizen who lives and breathes Almaty’s air effectively smokes 518 cigarettes per year. But the most popular places in Almaty raise this number to 700-800 cigarettes (Utyupin, 2026).

Level 2: Causes and Sources (Why is it happening?)

The second level of debate is for identifying the key factors of air pollution. And, accordingly, public opinion and experts highlight three main sources:

1. Private sector, which includes burning coal and garbage – there are more than 150,000 homes in Almaty. On weekends, due to the tradition of heating saunas, pollution levels increase by 20%.

2. Transportation: A huge fleet of older vehicles, driven without catalytic converters and producing toxic exhaust.

3. Thermal power plants and industry: Coal-fired thermal and electric power plants remain significant sources of emissions, especially during the heating season (Klemencova, 2026).

The discussion also touches on errors in urban planning. Dense, high-rise buildings create “heat islands” that impede air movement within the city’s natural “basin.” The situation is exacerbated by a natural inversion, in which a layer forms at an altitude of 800-1000 meters, “sealing” the smog within the city, like a gas chamber.

Level 3: Solutions and Measures (What can we do?)

The third level of debate moves to the search for specific tools to combat smog. In Almaty, both regulatory measures (the introduction of “low-emission zones” and fines for burning solid fuels) and economic incentives—for example, a buyback program for used cars at the median market value—are under discussion.

Some ambitious scientific and technical ideas are being considered. One popular proposal is the “air vacuum cleaner” project: planting many trees in the northern part of the city might create updrafts that break through the inversion layer and clear smog. Still, experts stress the importance of careful planning and computer modeling before moving forward. Residents are encouraged to use air purifiers and plan activities between 6:00 AM and 8:00 AM, when the air tends to be cleaner (Utyupin, 2026).

Level 4: Structural Change and Political Context (How to Change the System?)

At the highest level, debates address issues of environmental injustice and systemic responsibility. Researchers have documented a clear gap: residents of the “lower” districts (Turksib – 46.8 µg/m³) breathe air that is twice as polluted as in the “upper” districts (Bostandyk – 22.1 µg/m³).

Social surveys reveal a problem of “denial of responsibility”: car owners blame the thermal power plant, while private residents blame transportation. However, only 1% of private homeowners report burning waste, even though a third of respondents say they see this practice among their neighbors. This calls for a long-term strategy that should not be dependent on changes in akims.

A new vector of debate has emerged through creative formats, such as the “Taza Azilder” project. Through satire and images of the “Almaty of the

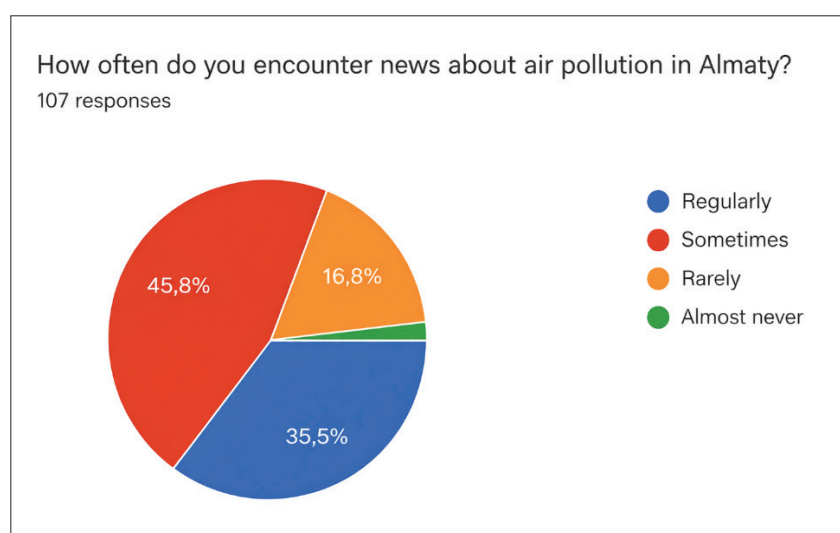
Future” (e.g., Christmas trees made from tires), activists seek to engage city residents in an emotional debate, emphasizing that smog has become a factor in migration—one in four residents is willing to leave the city because of environmental conditions (Arystanuly, 2026). Thus, the debate in Almaty has evolved from simply noting the dirt to demanding systemic data transparency and political will for deep reforms.

Furthermore, officials often use their social media pages to share one-sided information rather than genuinely engaging citizens in environmental policy discussions (Contri et al., 2026).

Survey results

According to the survey results, 35.5% of Almaty youth regularly encounter news about air pollution, while 45.8% report encountering it occasionally. That is shown in Figure 2.

Figure 2
How often do students encounter news about air pollution in Almaty?



Note: The chart was created by the author based on survey results.

An analysis of information sources revealed that social media is the primary source of information on air pollution, cited by 86% of respondents. And 41% of respondents use online media; 17.8% watch TV; 15.9% use Telegram channels as an information source; and 14% get news from friends.

Only 4.7% of respondents reported receiving no information about the city’s air quality. These data demonstrate the significant importance of digital communication channels in raising environmental awareness among Almaty youth. The data is shown in Figure 3 below.

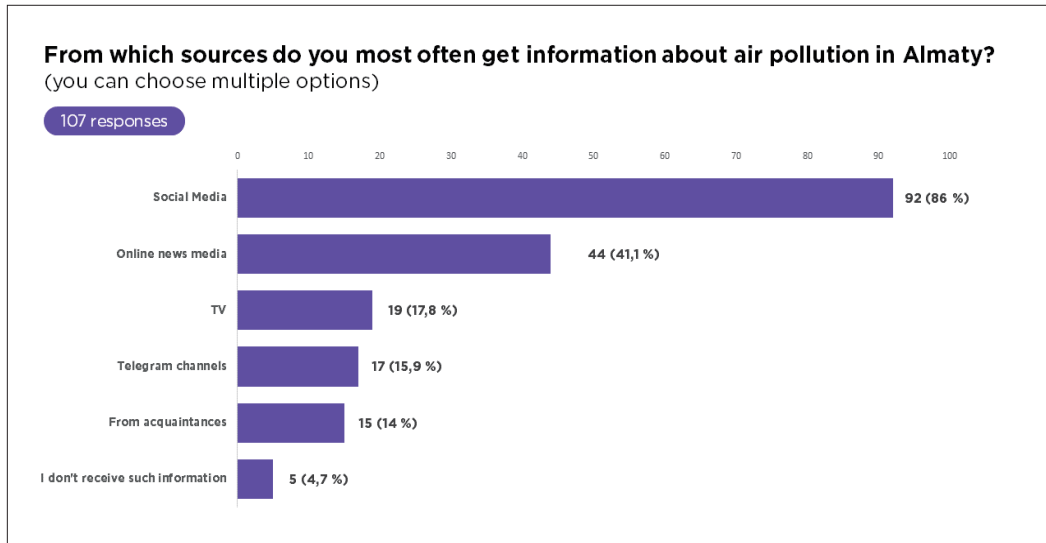
Vietnamese research shows clear age differences in the consumption of environmental content. For young people (18–34 years old), social media is the primary source of information (68.9%), while trust in traditional media (radio, print newspapers) is significantly lower than among older generations.

Furthermore, a paradox of trust emerges: despite the dominance of social media, young people consider scientists the most reliable source of information (63.5%), whereas media outlets are the least trusted among all channels (Vanderbloemen et al., 2025).

An analysis of perceptions of media content revealed that 47.7% of respondents believe media and social media merely state facts, 26.2% believe they express concern about the situation, 9.3% believe they provide recommendations to the public, 5.6% criticize government actions, and 11.2% were unsure. The data is in Figure 4.

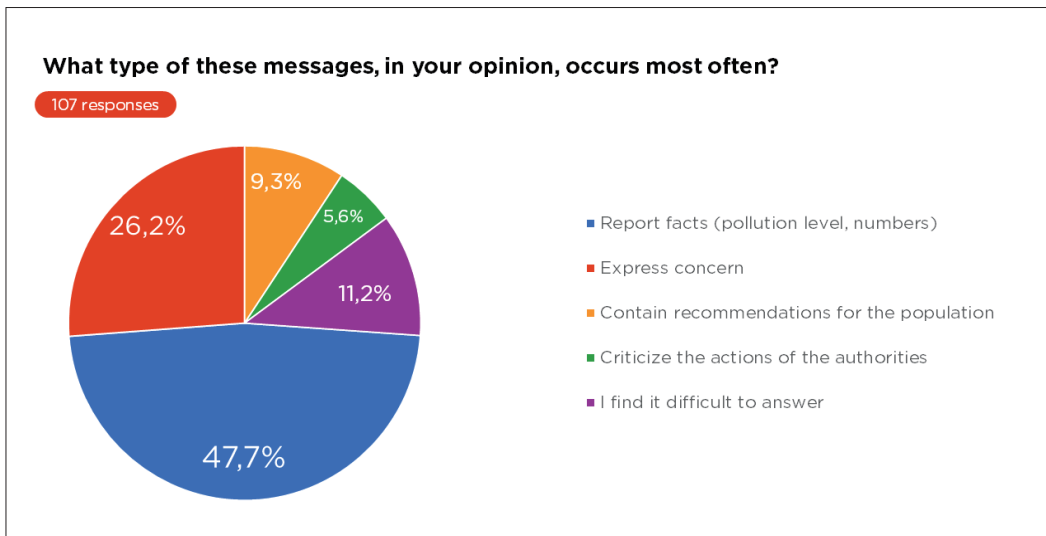
Furthermore, 39.3% of respondents reported that media texts do not include recommendations to limit time spent outdoors during periods of high pollution, 33.6% reported that such recommendations exist, and 27.1% could not recall any. The data is shown in Figure 5 below.

Figure 3
Sources of information about air pollution



Note: The chart was created by the author based on survey results.

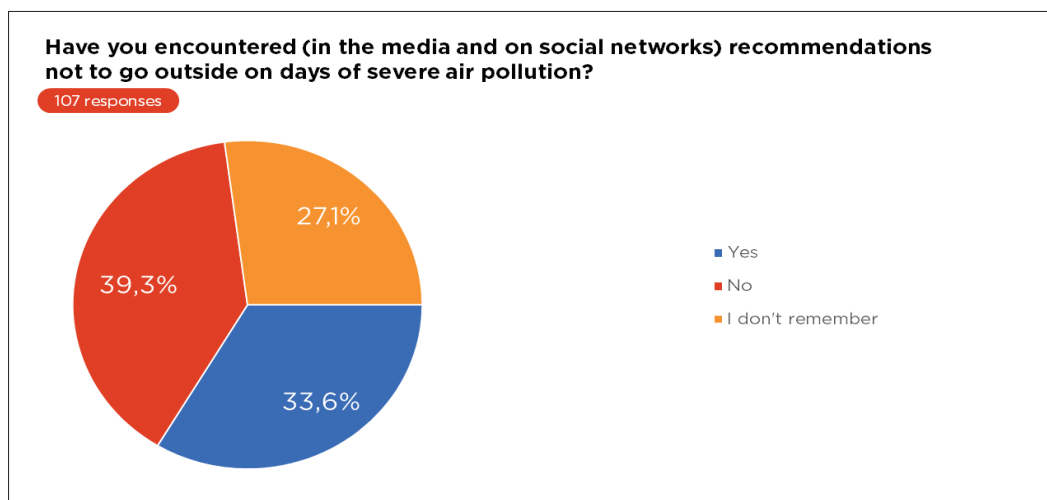
Figure 4
Types of messages that occur the most in the media



Note: The chart was created by the author based on survey results.

Figure 5

Did the respondent see the recommendations in the media not to go outside on days of severe air pollution?



Note: The chart was created by the author based on survey results.

Discussion

An integrated content analysis of sources and youth survey data reveals a disparity in the structure of public debate. On the one hand, Almaty demonstrates a mature expert discourse, reaching Level 4 of the Kenis and Barrat (2021) typology, in which the conversation engages with environmental injustice, systemic reforms, and long-term business investment, such as Halyk Bank's support for the Almaty Air Initiative (Nikitin, 2026).

On the other hand, university students' perception remains predominantly at Level 1. The dominance of social media (86%) as a source of information leads to the environmental agenda being perceived either as a collection of frightening facts or as background noise.

The survey data quantify this gap: although 81.3% of respondents encounter news about air pollution regularly or occasionally and 86% rely on social media as their primary source, only 9.3% recall practical recommendations, and only 5.6% notice criticism of government action. The remaining proportions describe what students perceive as the dominant message: 47.7% see media coverage as the mere statement of facts, and 26.2% as the expression of concern.

This configuration is best interpreted through the lens of framing theory. In Entman's (1993) formulation, any media frame performs four functions: it defines a problem, attributes cause, makes moral evaluations, and recommends treatments. The domi-

nance of "mere facts" perception (47.7%) and the near-absence of perceived recommendations (9.3%) suggest that Kazakhstani media coverage prioritizes problem-definition and causal-attribution frames, while treatment-oriented framing remains marginal. A comparable deficit has been documented in Indian online coverage by Murukutla et al. (2017), where attention concentrated on metropolitan symptoms without producing a comprehensive risk discourse, and in Ghanaian newspapers by Agyei-Mensah et al. (2022), who showed that negative health consequences were typically mentioned only in passing. The Almaty case, however, departs from the London pattern reported by Kenis and Barratt (2021), where adversarial frames around Oxford Street air quality politicized the debate and pushed it towards higher levels of public contestation. The implication is that exposure-saturated environments without frame diversity tend to reproduce, rather than close, the gap between awareness and action.

Agenda-setting theory offers a complementary lens. McCombs and Shaw (1972) distinguished two levels of media influence: first-level agenda-setting determines which issues audiences consider important (object salience), while second-level agenda-setting shapes which attributes of those issues are foregrounded (attribute salience). The 81.3% exposure rate documented in the survey indicates that first-level agenda-setting operates efficiently in Almaty: the object "air pollution" is firmly inscribed in the youth agenda. The breakdown is at the second level – the attributes that reach young audiences are

predominantly symptomatic (PM_{2.5} readings, global rankings, the “518 cigarettes” metaphor). While attributes of accountability and action remain confirmed to expert circles. The dominance of social media as the primary channel (86%) compounds this asymmetry, because platform algorithms tend to amplify affectively charged content over completeness of framing. This pattern is broadly consistent with the Hanoi data reported by Vanderbloemen et al. (2025), where 68.9% of young respondents named social media as their main source of environmental information, and a paradox of trust emerged: media were the least trusted channel, even as they remained the most used.

A third layer of explanation comes from construal-level theory (Trope & Liberman, 2010), which holds that the more psychologically distant an object is perceived to be, the more abstractly it is mentally represented, and the weaker the resulting behavioral motivation. Spence, Poortinga, and Pidgeon (2012) extended this insight to environmental risk, showing that proximal, concrete framings of climate threats correlate with stronger willingness to act. The Almaty case presents a striking paradox in these terms: spatial distance between the audience and the risk is effectively zero – respondents physically breathe the air they read about – yet the media discourse continues to produce psychological distance along other dimensions. The finding that 39.3% of respondents never encountered advisories to limit time outdoors on smoggy days, while 27.1% could not recall such advisories at all, indicates that the proximal behavioral cues required to lower construal levels are simply not reaching the audience. From the standpoint of construal-level theory, this absence of concrete, here-and-now action prescriptions sustains an abstract, agent-displaced perception of an objectively immediate risk.

The convergence of evidence from Almaty, Hanoi (Vanderbloemen et al., 2025), Indian metropolises (Murukutla et al., 2017), and Ghanaian cities (Agyei-Mensah et al., 2022) suggests that the treatment-frame deficit is not an idiosyncrasy of any single national setting but a recurring configuration of environmental media ecosystems in rapidly digitizing urban contexts outside the Anglophone adversarial-journalism tradition. To describe this configuration, we tentatively propose the term truncated cascade: a state in which structural and political framing matures at the expert level (Level 4 in the Kenis and Barratt typology) but fails to migrate into the framing register that reaches young audiences through social media, which remains anchored at

Level 1. As a parsimonious comparative indicator of this truncation, we propose the exposure-to-efficacy ratio – the ratio between the share of an audience exposed to coverage of an environmental issue and the share recalling practical recommendations associated with it. For our Almaty sample this ratio stands at approximately 9:1 (81.3% exposure against 9.3% efficacy recall), which may serve as a baseline against which other Central Asian and post-Soviet cities can be compared in future research.

One of the limitations of current media coverage in Almaty is precisely this scarcity of health-protective and environmentally literate content. Coverage tends to crystallize around political statements or short-term events such as severe smog episodes, rather than offering audiences workable recommendations. The “cigarette equivalent” frame – the claim that an average Almaty resident inhales the equivalent of 518 cigarettes per year – has performed its attention-attracting function at Level 1 of public awareness, but it cannot, by itself, move the discourse toward Levels 3 (solutions) and 4 (structural change). To effectively engage young audiences in long-term strategic action, a shift in media focus is required: from symptomatic reporting toward digital tools and creative formats that articulate concrete behavioral and civic options, in the spirit of the practical orientation that Agyei-Mensah et al. (2022) recommend for environmental coverage more broadly. The “Taza Azilder” satirical projects (Arystanuly, 2026), already discussed in the Results section, exemplify the kind of emotionally engaging, action-oriented format that can begin to bridge the cascade between expert and mass discourse.

Taken together, these results support a layered answer to the question of whether media exposure to air-pollution coverage translates into concern and behavioral intention among young residents of Almaty. Exposure is high, but it is mediated by frame structures, attribute hierarchies, and psychological-distance constructions that systematically privilege awareness over action. This is consistent with the broader observation that high awareness does not necessarily translate into environmental behavior, even in large cities where the seriousness of the problem is widely acknowledged (Vanderbloemen et al., 2025). At the same time, our findings should be read with caution: the sample is geographically and demographically narrow, dominated by first- and second-year students of Almaty universities, and the content analysis is exploratory in scale. The patterns we identify, therefore, should be understood as a basis for hypothesis development, par-

ticularly for future comparative work across Central Asian cities, rather than as conclusive evidence of a regional regularity.

Conclusion

An analysis of the structure of public debate and perceptions of the air pollution problem in Almaty allows us to formulate the following key findings:

1. Disparity in awareness levels, according to a profound gap between expert and mass discourse, characterizes Kenis and B. Barratt's typology of public discourse in Almaty. While experts and activists have reached the fourth level of debate (discussing systemic reforms, environmental injustice, and long-term strategies), the mass consciousness of young people remains at the first level (regarding symptoms). Survey results confirm this, because 47.7% of respondents perceive media content as mere statements of fact.

2. The effectiveness of visual metaphors in the face of a lack of practice. The use of the "cigarette equivalent" (an average of 518 cigarettes per year) has proven a successful tool for drawing attention to the problem at the first level of awareness. However,

the study revealed a critical "information gap" at the third level (Solutions): despite high levels of smog-related news consumption (81.3% of students report encountering it regularly or occasionally), 39.3% of respondents report receiving no practical health protection recommendations. This indicates that expert advice (e.g., taking walks between 6:00 and 8:00 a.m.) is not reaching the general public.

3. Dominance of digital channels and passive perception. Social media is the primary source of information for 86% of young people, making it the primary platform for environmental education. However, this channel has not yet fostered active civic engagement: only 5.6% of respondents notice criticism of government actions in the media. This aligns with data from sources indicating the need for a systemic strategy that is independent of changes in city leadership, a need that remains poorly articulated in the mass digital space.

Author Contributions

Talgat Sh.: *Conceptualization, Methodology, Writing – Original Draft, Review & Editing.*

Alpysbayev T.: *Investigation, Data Curation, Formal Analysis, Visualization, Validation.*

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