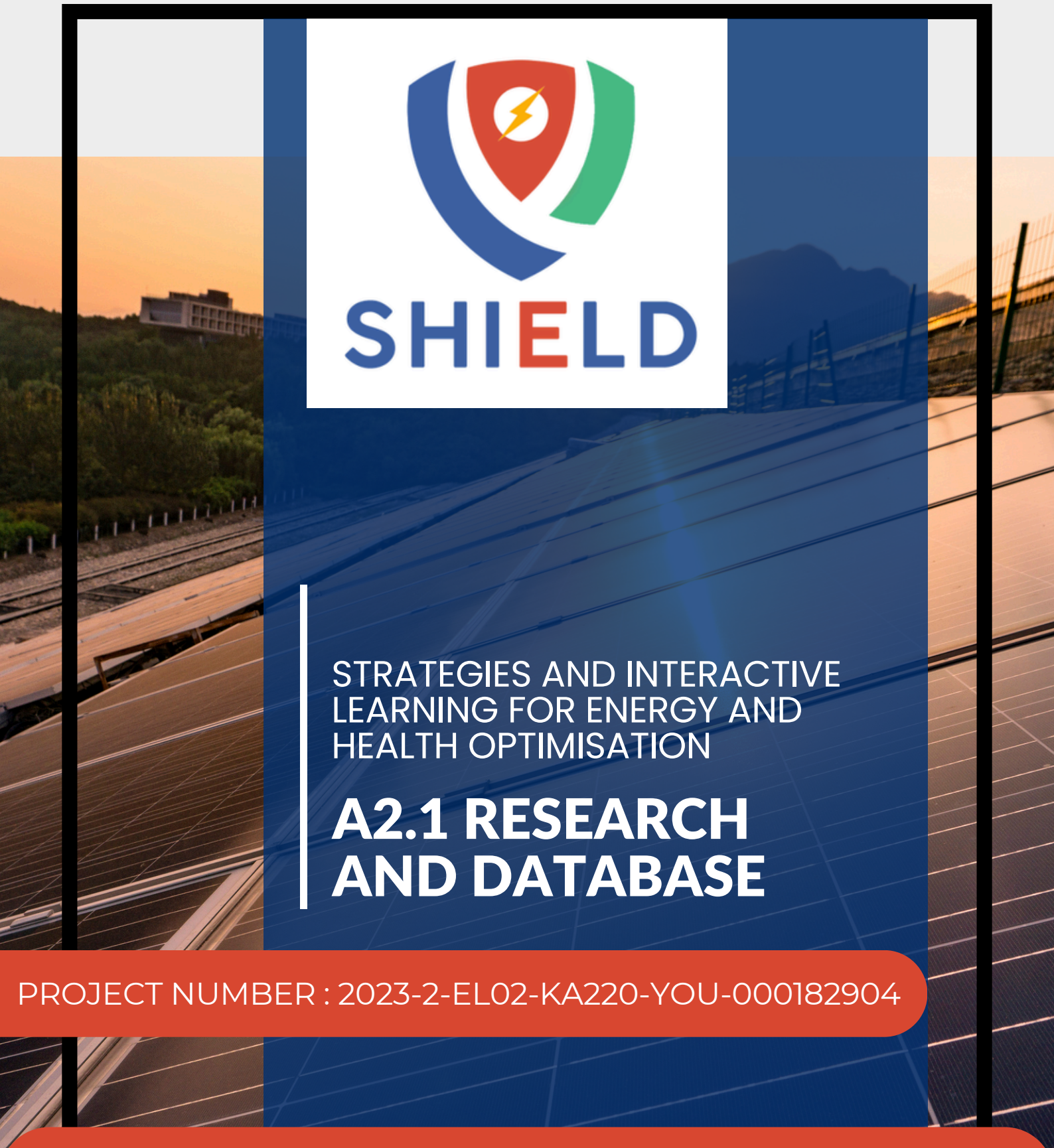

SHIELD

STRATEGIES AND INTERACTIVE LEARNING FOR ENERGY AND HEALTH OPTIMISATION

A2.1 RESEARCH AND DATABASE

PROJECT NUMBER : 2023-2-EL02-KA220-YOU-000182904

www.shield-project.eu

UNIVERSITY OF WESTERN MACEDONIA

Erasmus+
Enriching lives, opening minds.

Co-funded by the European Union

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Introduction

The SHIELD project (Strategies and Interactive Learning for Energy and Health Optimisation) is an innovative European initiative under the Erasmus+ programme, aiming to empower young people by linking sustainable energy practices with physical and mental health awareness. In the face of growing environmental and social challenges, the project seeks to equip youth with the knowledge and competencies necessary to become active, informed, and responsible citizens capable of contributing to more resilient and inclusive communities.

Starting with research and the development of educational tools, SHIELD employs participatory and interactive non-formal learning methods, including game-based learning techniques, to help young people better understand the complex relationship between energy choices, climate change, and holistic well-being. At the same time, it enhances their digital readiness and capacity to adapt in rapidly evolving social and technological contexts.

The project is implemented by a multidisciplinary partnership that brings together academic expertise, youth empowerment experience, and local sustainable development practices. The consortium includes the Laboratory of Environmental Technology of the University of Western Macedonia (Greece), the DRVO Association (Croatia), and the Korenyak Foundation (Bulgaria).

SHIELD's long-term ambition is to create an open and accessible digital learning ecosystem, foster environmental literacy among youth, and develop collaborative actions that positively impact the well-being of local communities in Greece and across Europe.

Research and Database

Introduction

The "Research and Database" component of the SHIELD project plays a foundational role in shaping the educational, training, and community-focused activities of the initiative. It serves as a critical baseline for understanding the perceptions, needs, knowledge gaps, and behavioral tendencies of young people regarding the intersection between energy use and health—both physical and mental.

The primary objective of this research phase was to collect and analyze reliable, youth-centered data that can inform the development of interactive learning modules and capacity-building tools. Through the use of digital questionnaires, we gathered both quantitative and qualitative insights from participants across different communities, enabling us to build a comprehensive database. This database now supports evidence-based decision-making throughout the implementation of the project.

Questionnaire

Introduction

As part of our data collection strategy, we designed and deployed an online questionnaire aimed at capturing youth perspectives on the relationship between energy consumption, environmental sustainability, and health. The questionnaire was completed by 60 respondents, primarily young people and individuals active in the youth sector.

The structure of the questionnaire reflects the interdisciplinary nature of the SHIELD project. Questions were grouped thematically across three key dimensions:

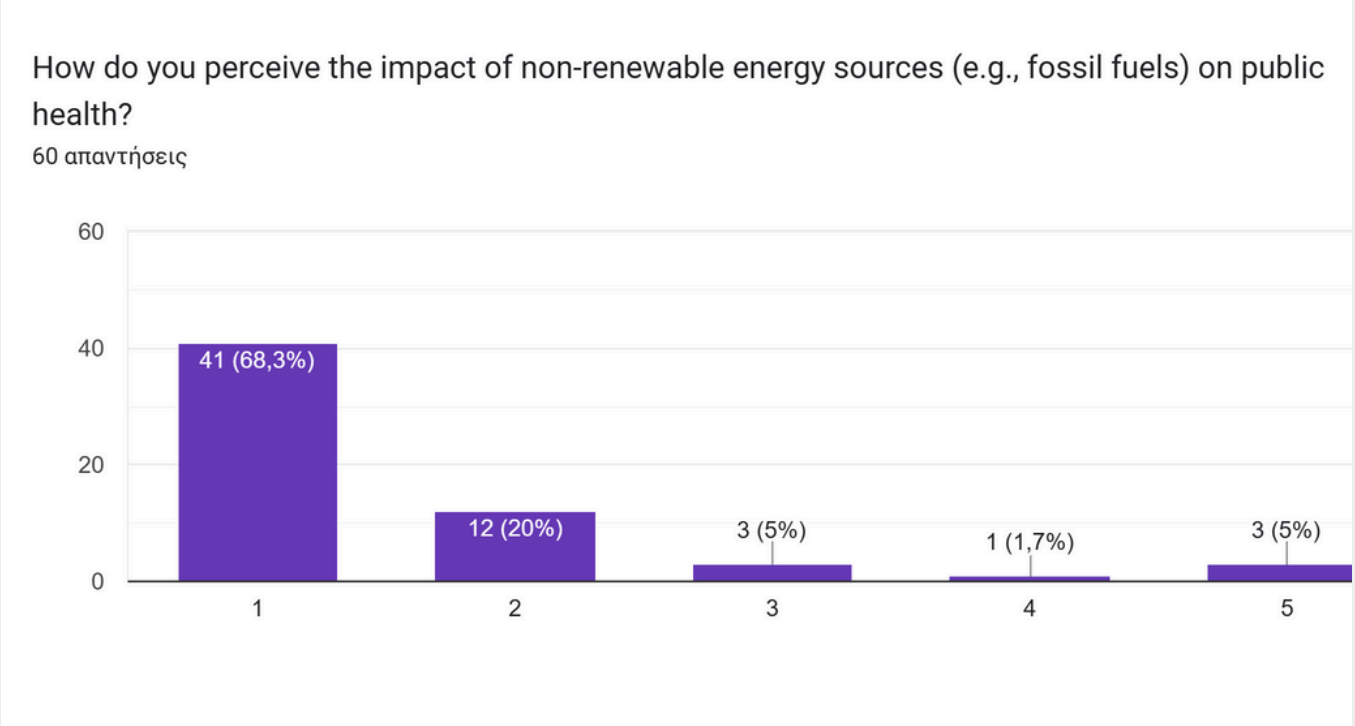
1. Energy and Public Health Nexus – evaluating awareness of health implications from energy sources.
2. Mental Health and Social Impact – exploring anxiety, stress, and emotional responses related to climate and energy issues.
3. Behavioral Barriers and Motivators – identifying obstacles and incentives influencing personal energy-related choices.

This tool allowed us to not only collect numerical data, but also to detect underlying patterns in environmental attitudes, mental health concerns, and readiness to adopt more sustainable lifestyles.

ANSWERS ANALYSE

A) General Energy-Health Nexus Questions

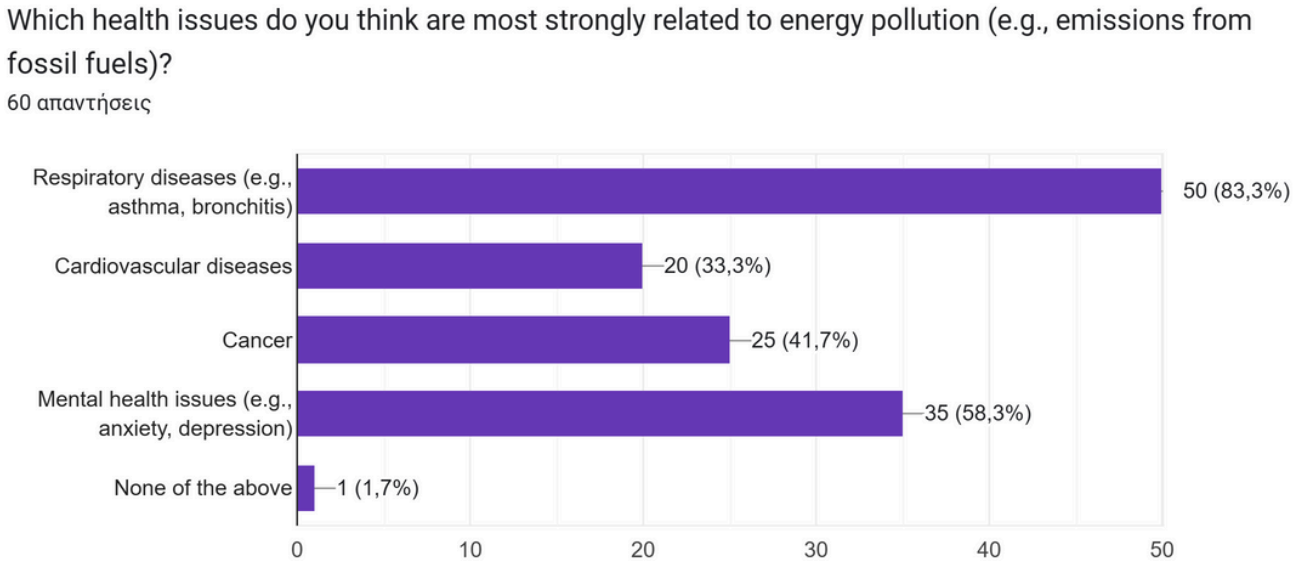
1. How do you perceive the impact of non-renewable energy sources (e.g., fossil fuels) on public health?



The results from the question "How do you perceive the impact of non-renewable energy sources (e.g., fossil fuels) on public health?" indicate a strong consensus among respondents regarding the negative effects of fossil fuels. A significant majority — 68.3% (41 out of 60 respondents) — rated the impact as extremely negative (rating 1), while 20% selected a slightly less severe but still negative perspective (rating 2).

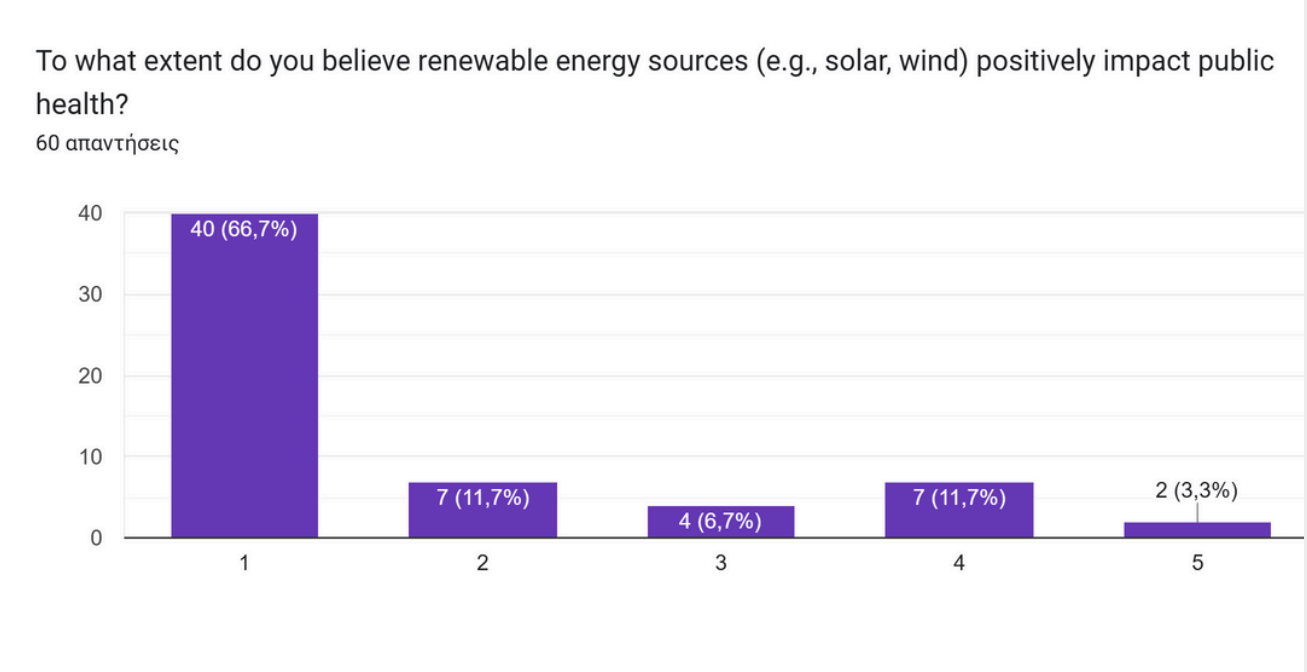
Only a small minority rated the impact as neutral or positive (ratings 3 to 5 combined total just 11.7%). This clear skew toward the negative end of the spectrum highlights a well-established awareness among participants about the harmful consequences of fossil fuel use on public health, aligning with global concerns over air pollution, respiratory diseases, and long-term health risks caused by emissions.

2. Which health issues do you think are most strongly related to energy pollution (e.g., emissions from fossil fuels)?



In response to the question "Which health issues do you think are most strongly related to energy pollution (e.g., emissions from fossil fuels)?", the vast majority of participants identified respiratory diseases as the primary health concern, with 83.3% (50 out of 60) selecting this option. This strong correlation is likely due to the well-documented link between air pollution and conditions like asthma and bronchitis. Additionally, 58.3% associated energy pollution with mental health issues, such as anxiety and depression, highlighting increasing public recognition of the psychological stress caused by environmental degradation. 41.7% linked fossil fuel emissions to cancer, and 33.3% to cardiovascular diseases, both of which are supported by growing scientific evidence. Only one respondent (1.7%) believed there was no connection between energy pollution and health issues. Overall, the responses reflect a high level of awareness regarding the broad and multifaceted impact of energy pollution on human health.

3. To what extent do you believe renewable energy sources (e.g., solar, wind) positively impact public health?

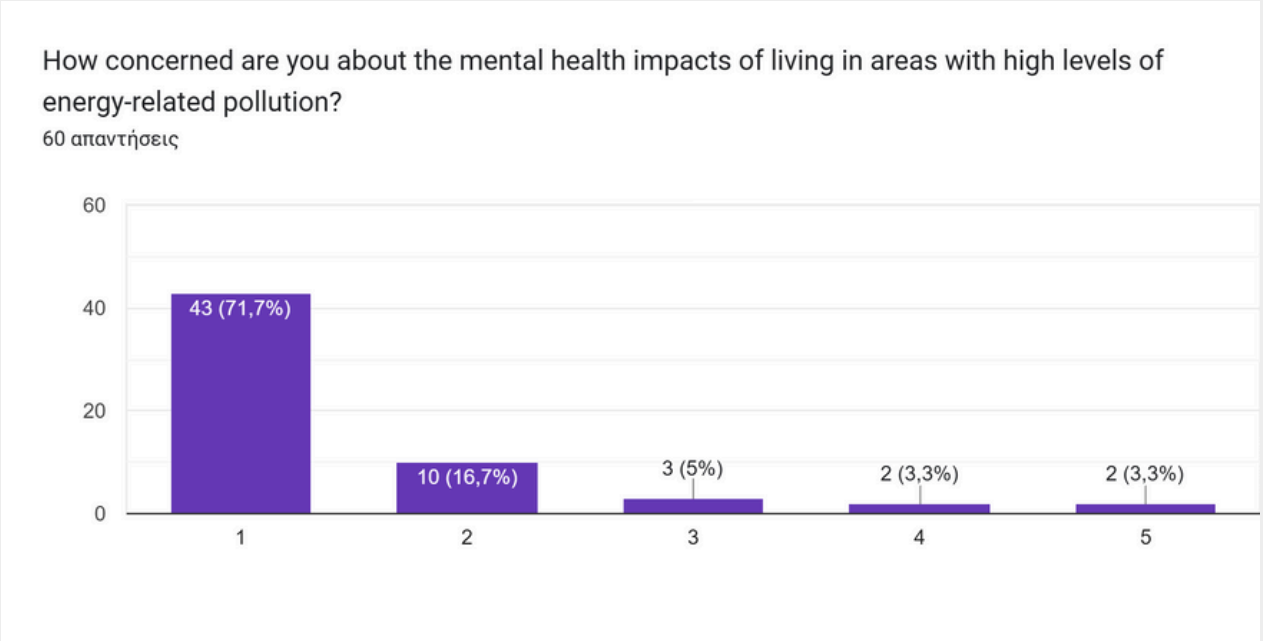


The responses to the question "To what extent do you believe renewable energy sources (e.g., solar, wind) positively impact public health?" demonstrate a strong positive perception among participants. 66.7% (40 out of 60) believe to the highest extent that renewable energy contributes positively to public health. Smaller percentages gave moderate responses, with 11.7% each choosing levels 2 and 4, and 6.7% selecting a more neutral stance (level 3).

Only 3.3% rated the impact at the lowest level of positivity (level 5). These findings suggest that respondents widely acknowledge the health benefits of renewables—such as cleaner air, reduced pollution-related illnesses, and lower stress levels—while only a marginal number expressed skepticism or uncertainty.

B) PSYCHOLOGICAL AND SOCIAL ASPECTS

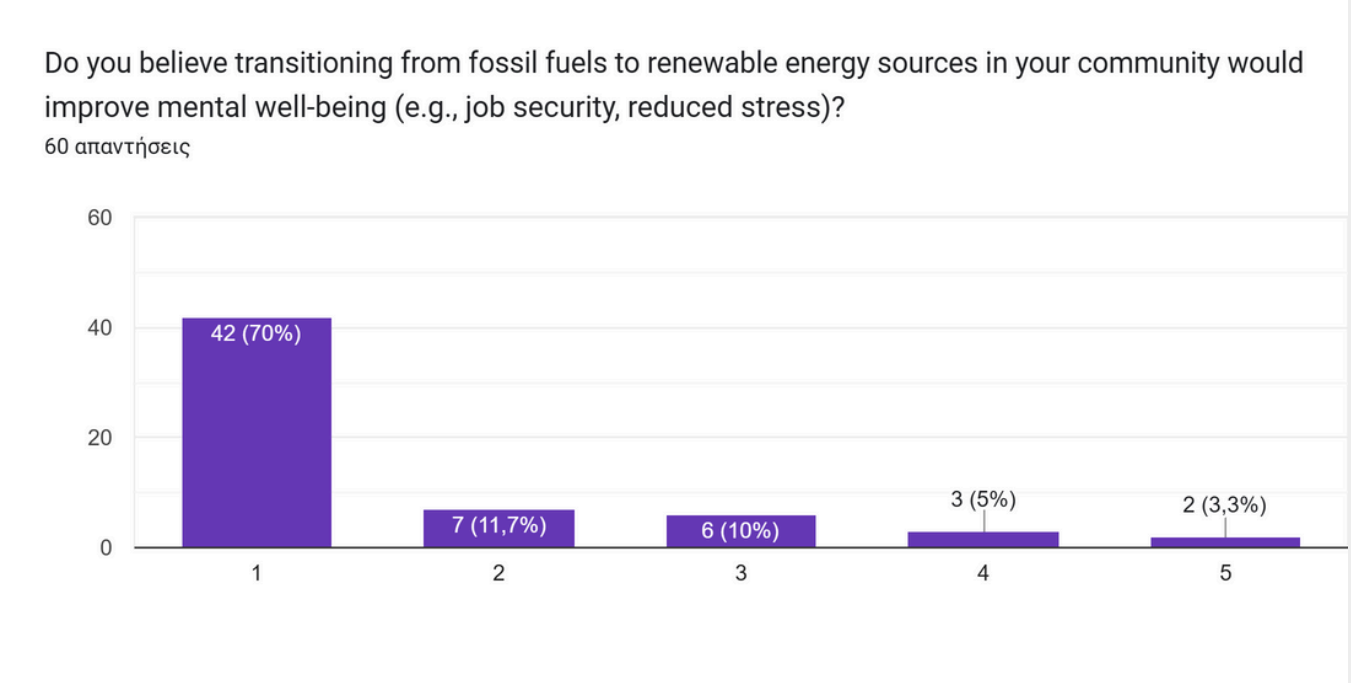
1. How concerned are you about the mental health impacts of living in areas with high levels of energy-related pollution?



In response to the question "How concerned are you about the mental health impacts of living in areas with high levels of energy-related pollution?", the data reveals a strong level of concern among participants. 71.7% (43 out of 60) expressed the highest level of concern (rating 1), while another 16.7% (10 respondents) rated their concern at level 2. The remaining responses were scattered across the lower concern levels, with only 3.3% choosing each of the lowest ratings (4 and 5).

These results suggest that the majority of respondents recognize a direct link between environmental pollution and psychological well-being, aligning with emerging research on eco-anxiety, chronic stress, and the psychological burden of environmental degradation. This high awareness presents an opportunity for further educational and policy-driven initiatives that connect mental health to environmental justice.

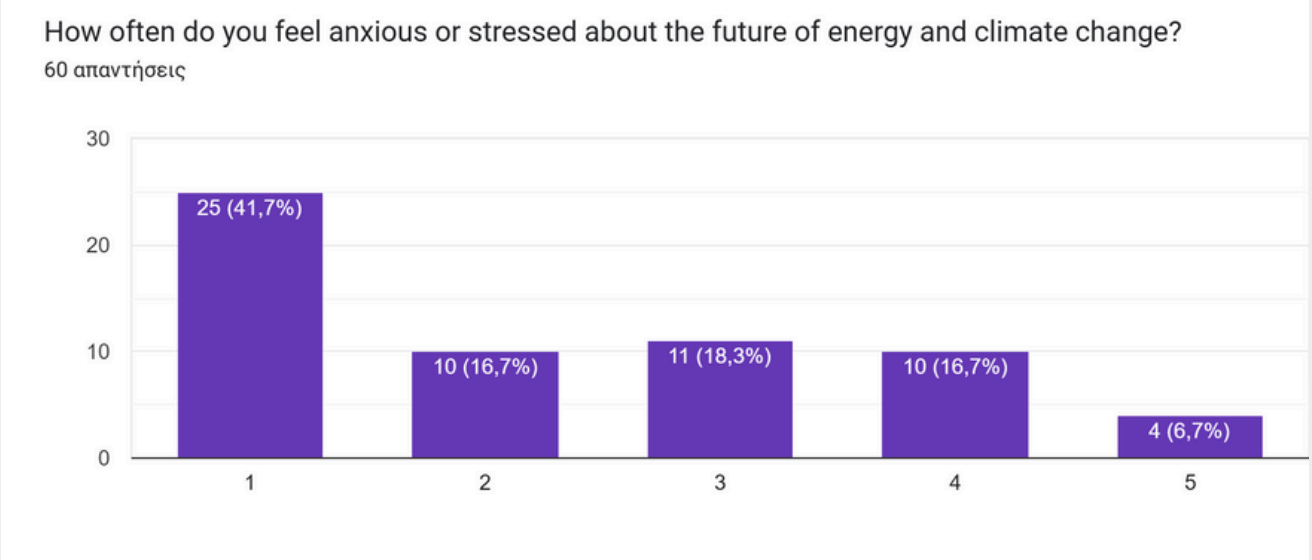
2. Do you believe transitioning from fossil fuels to renewable energy sources in your community would improve mental well-being (e.g., job security, reduced stress)?



In response to the question "Do you believe transitioning from fossil fuels to renewable energy sources in your community would improve mental well-being (e.g., job security, reduced stress)?", the results show a strong belief in the mental health benefits of such a transition. 70% (42 out of 60 respondents) selected the highest level of agreement (rating 1), suggesting a strong conviction that renewable energy adoption could lead to improved well-being, particularly through increased job stability, cleaner environments, and reduced climate-related anxiety.

A smaller portion of respondents selected moderate agreement (ratings 2 and 3), making up 21.7% in total, while only 8.3% expressed doubt or disagreement. This reflects a growing awareness of the social and psychological dimensions of the green transition, beyond just its environmental or economic implications.

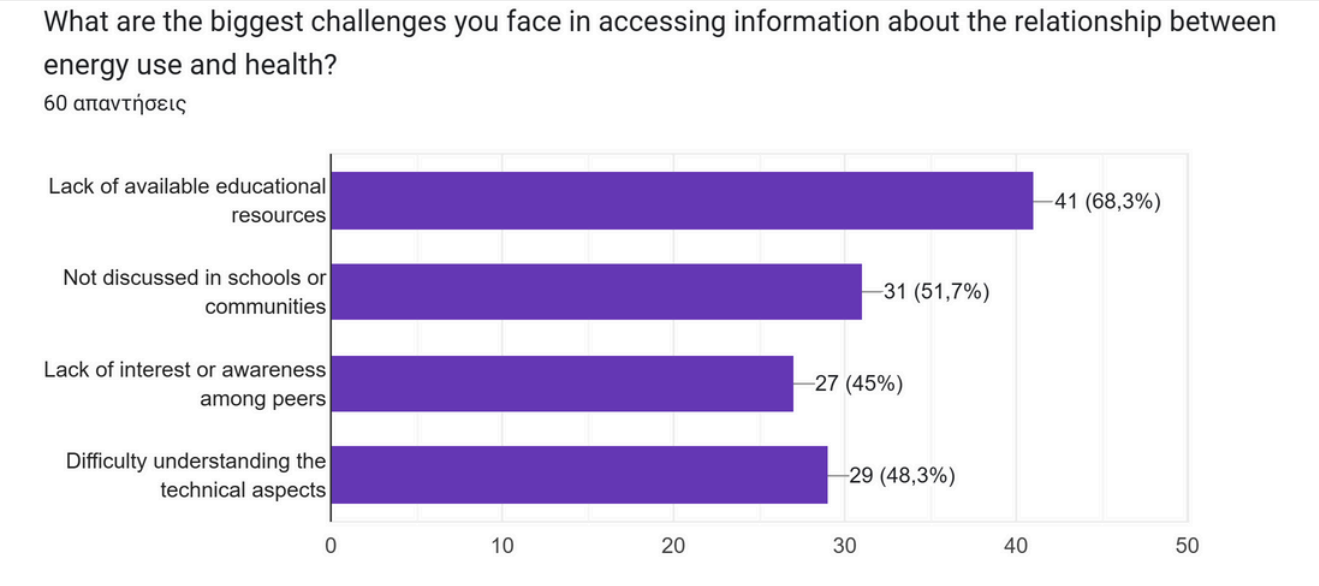
3. How often do you feel anxious or stressed about the future of energy and climate change?



The responses to the question "How often do you feel anxious or stressed about the future of energy and climate change?" highlight a notable prevalence of eco-anxiety among participants. 41.7% (25 out of 60 respondents) indicated that they frequently experience anxiety or stress about these issues (rating 1), while the rest of the responses are more evenly distributed across the spectrum. 16.7% chose both ratings 2 and 4, and 18.3% selected a moderate level of concern (rating 3). Only 6.7% (4 respondents) stated that they rarely or never feel anxious (rating 5).

These findings suggest that climate and energy futures are a significant source of psychological distress for many young people, reinforcing the importance of addressing mental health and emotional resilience in environmental education and policy planning.

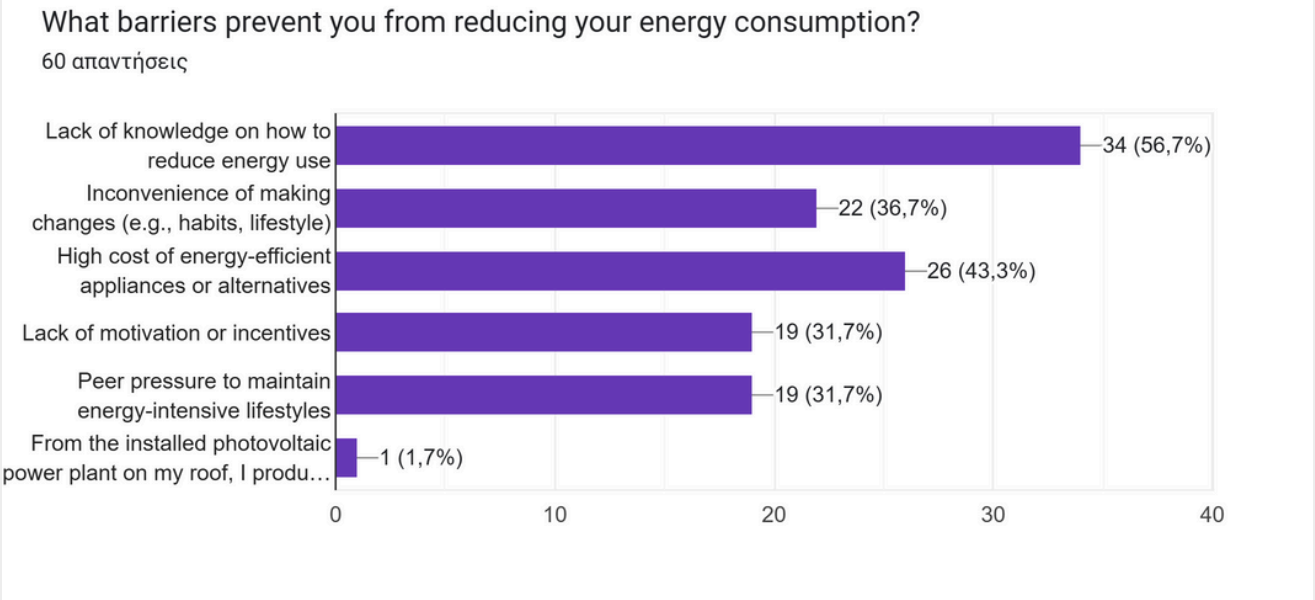
4. What are the biggest challenges you face in accessing information about the relationship between energy use and health?



In the question "What are the biggest challenges you face in accessing information about the relationship between energy use and health?", the most frequently cited barrier was the lack of available educational resources, selected by 68.3% (41 respondents). This was followed by lack of discussion in schools or communities (51.7%), difficulty understanding technical aspects (48.3%), and lack of interest or awareness among peers (45%).

These results reveal a multifaceted gap in both access and communication: not only are resources scarce, but existing information is often inaccessible due to either complexity or lack of integration into mainstream education and peer discussions. The findings suggest a need for more youth-friendly, inclusive, and contextually relevant educational interventions that connect energy literacy to real-life health outcomes.

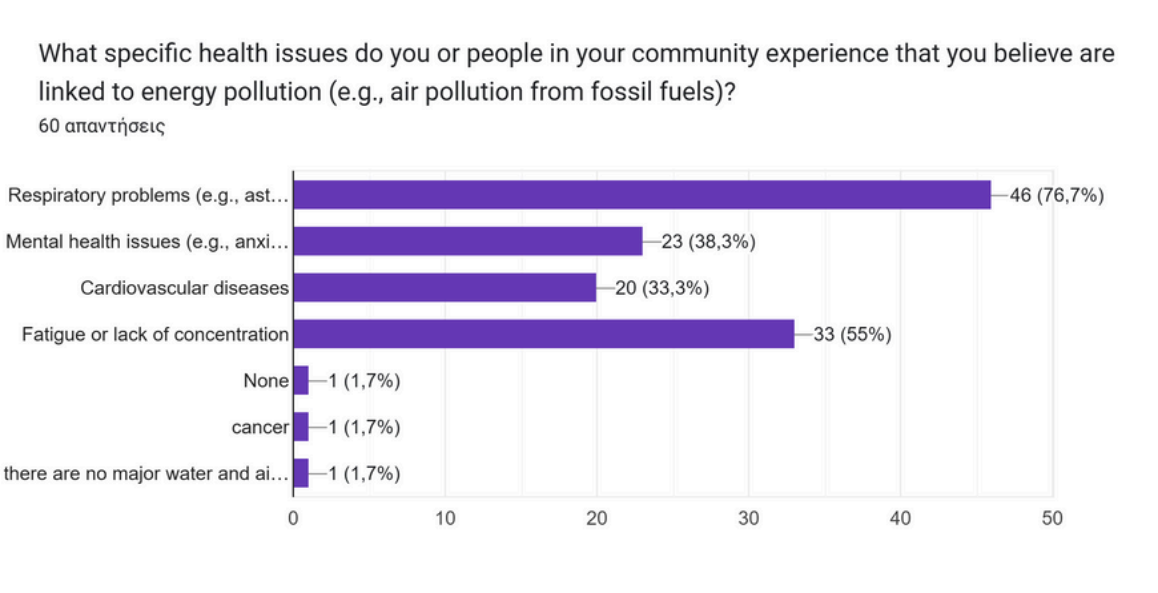
5. What barriers prevent you from reducing your energy consumption?



In answering the question "What barriers prevent you from reducing your energy consumption?", respondents highlighted a range of obstacles—both practical and psychological. The most commonly reported barrier was a lack of knowledge on how to reduce energy use, selected by 56.7% (34 respondents). This was followed by the high cost of energy-efficient appliances or alternatives (43.3%), and the inconvenience of making changes to habits or lifestyle (36.7%). Additionally, 31.7% cited lack of motivation or incentives and peer pressure to maintain energy-intensive lifestyles, indicating that social norms and motivation play significant roles in shaping behavior.

Only 1 respondent (1.7%) mentioned already producing their own energy from photovoltaics. These findings suggest that while cost and convenience remain key challenges, a large part of the issue lies in knowledge gaps and behavioral inertia—factors that the SHIELD project can directly address through awareness campaigns and youth-focused training.

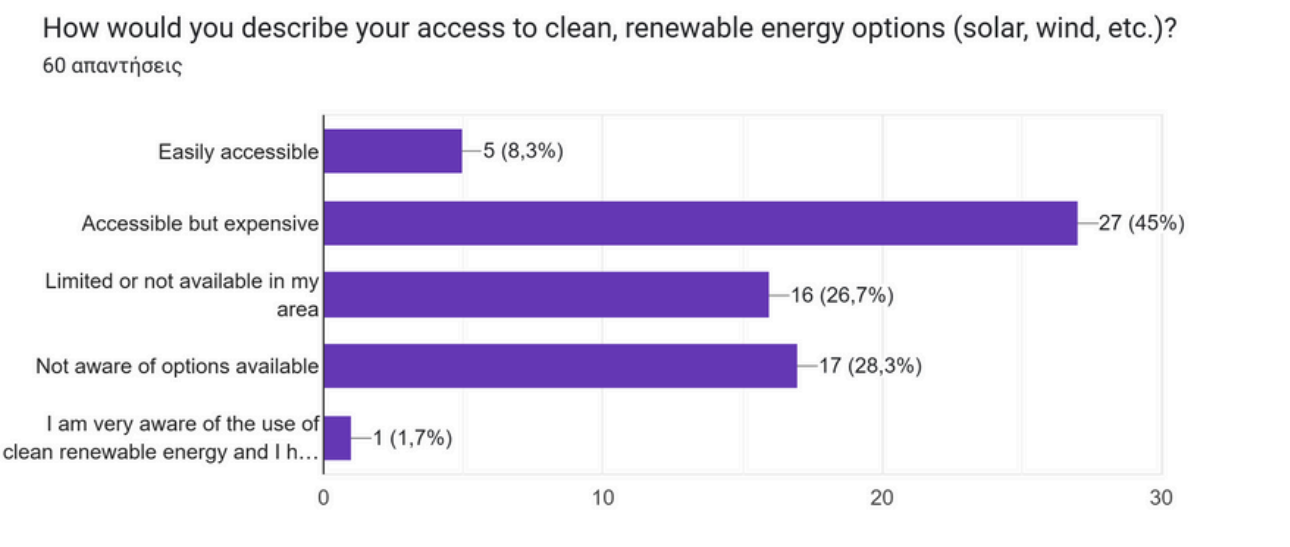
6. What specific health issues do you or people in your community experience that you believe are linked to energy pollution (e.g., air pollution from fossil fuels)?



In the question "What specific health issues do you or people in your community experience that you believe are linked to energy pollution (e.g., air pollution from fossil fuels)?", 76.7% of respondents (46 out of 60) pointed to respiratory problems as the most common and recognizable health issue, confirming widespread awareness of the direct link between fossil fuel emissions and conditions like asthma or bronchitis. 55% also identified fatigue or lack of concentration, a less obvious but equally important consequence of prolonged pollution exposure.

Mental health issues (38.3%) and cardiovascular diseases (33.3%) were also acknowledged, reflecting an understanding of the broader physiological and psychological burden that environmental degradation can impose. Only a few participants selected "cancer", "none", or provided comments indicating no perceived issues. These results underline the diversity of health concerns linked to environmental quality and highlight the need for integrative educational tools that address both physical and mental well-being within environmental contexts.

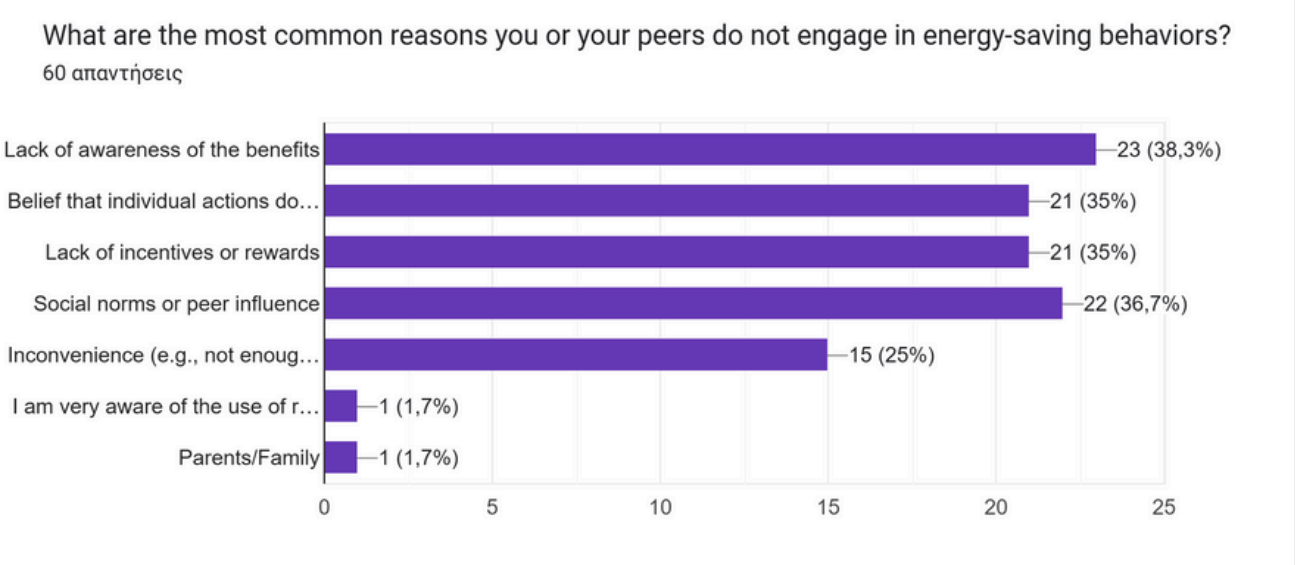
7. How would you describe your access to clean, renewable energy options (solar, wind, etc.)?



In response to the question "How would you describe your access to clean, renewable energy options (solar, wind, etc.)?", the majority of participants (45% or 27 out of 60) reported that such options are accessible but expensive, highlighting cost as a primary barrier to adoption. A notable 28.3% stated they are not aware of available options, while 26.7% indicated that renewables are limited or not available in their area.

Only 8.3% found renewable energy easily accessible, and just one respondent (1.7%) claimed both high awareness and personal involvement in clean energy use. These findings suggest that while interest may exist, accessibility—especially financial—and informational gaps significantly hinder the transition to renewables. Addressing these issues through community-level awareness campaigns and affordable energy programs would be essential in enhancing access and adoption.

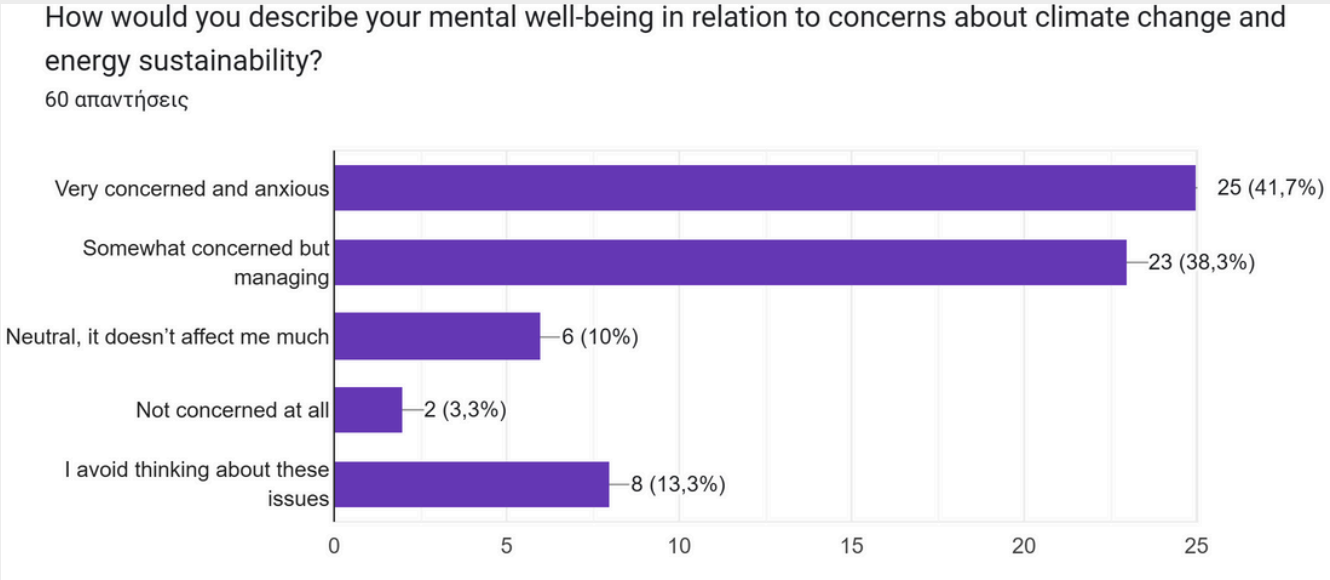
8. What are the most common reasons you or your peers do not engage in energy-saving behaviors?



When asked "What are the most common reasons you or your peers do not engage in energy-saving behaviors?", participants pointed to a combination of informational, motivational, and social factors. The top reason was lack of awareness of the benefits, cited by 38.3% (23 respondents), followed closely by belief that individual actions do not make a difference and lack of incentives or rewards, both at 35%. Social norms or peer influence was also a notable factor (36.7%), revealing the role of group behavior and perceptions in shaping energy habits.

Inconvenience—such as lack of time or resources—was mentioned by 25%, while two respondents referenced personal awareness or family influence. These results suggest that energy-saving behavior is often hindered not by apathy, but by a perceived lack of efficacy, support, or external encouragement. This insight emphasizes the importance of community-level engagement, positive reinforcement, and clearer communication of the tangible benefits of energy-conscious lifestyles.

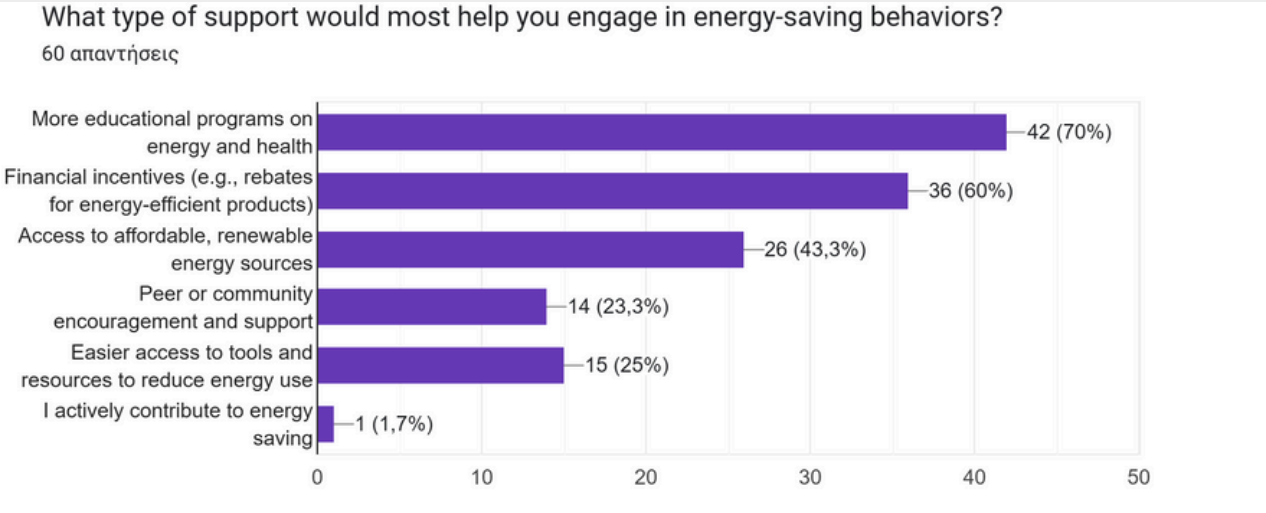
9. How would you describe your mental well-being in relation to concerns about climate change and energy sustainability?



In response to the question "How would you describe your mental well-being in relation to concerns about climate change and energy sustainability?", the majority of participants reported significant psychological impact. 41.7% (25 respondents) described themselves as very concerned and anxious, while 38.3% (23 respondents) said they were somewhat concerned but managing, showing that nearly 80% of the sample experiences some level of climate-related stress.

A smaller portion of the group reported being neutral (10%) or actively avoiding the topic (13.3%), while only 3.3% claimed to be not concerned at all. These responses highlight the growing prevalence of eco-anxiety among youth and the emotional weight carried by concerns over environmental and energy futures. This emphasizes the need for integrating mental health support and resilience-building components into climate education and policy discourse.

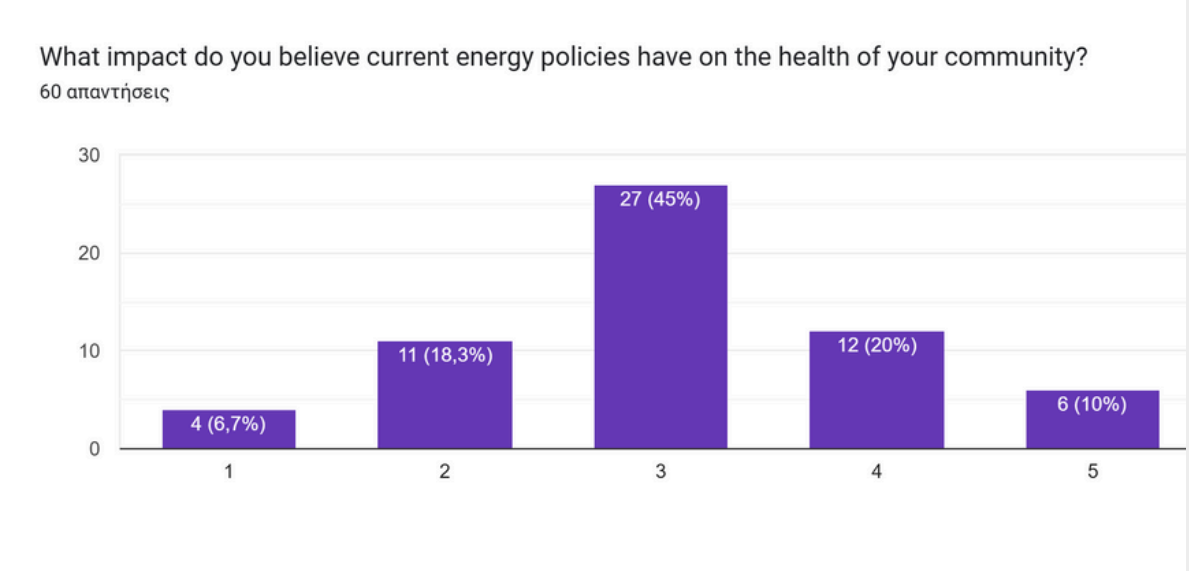
10. What type of support would most help you engage in energy-saving behaviors?



For the question "What type of support would most help you engage in energy-saving behaviors?", the results clearly show that education is considered the most powerful enabler. 70% of respondents (42 out of 60) chose more educational programs on energy and health as the top form of support, highlighting a strong demand for knowledge and awareness. Financial incentives (e.g., rebates for efficient appliances) were the second most popular response, selected by 60%, indicating that affordability remains a major factor in energy-saving behavior.

Additionally, 43.3% expressed the need for access to affordable, renewable energy sources, while fewer participants emphasized tools and resources (25%) and community encouragement (23.3%). Only 1 respondent (1.7%) reported already contributing actively to energy saving. Overall, the data reflects a dual need for both informational and structural support—underscoring that when people understand why and are given the means to act, they are more likely to adopt sustainable habits.

11. What impact do you believe current energy policies have on the health of your community?

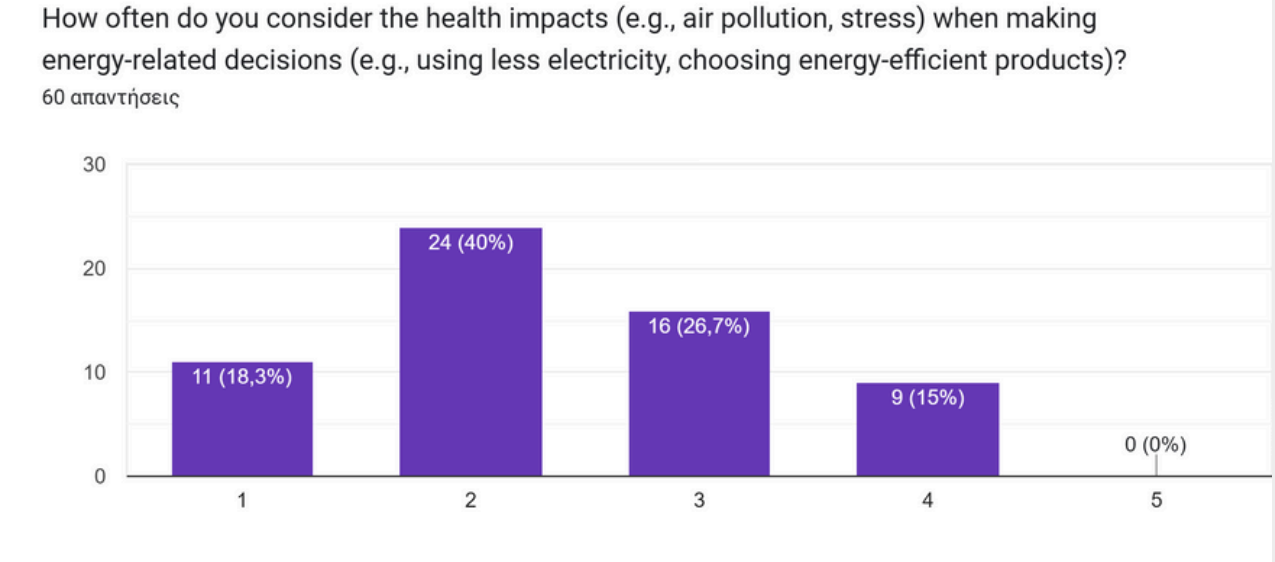


For the question "What impact do you believe current energy policies have on the health of your community?", the responses suggest a predominantly neutral to moderately positive perception. The most common answer was neutral (rating 3), selected by 45% (27 out of 60 respondents), indicating that many participants either see no tangible effects or are uncertain about policy impacts.

Meanwhile, 30% of respondents leaned toward a positive view (20% for rating 4 and 10% for rating 5), whereas only 25% perceived the effects as negative (6.7% at rating 1 and 18.3% at rating 2). These findings reveal a degree of skepticism or disconnect between policy frameworks and public health outcomes as experienced by local communities. They underscore the need for more visible, transparent, and health-oriented energy policies that can translate environmental progress into perceived benefits for everyday well-being.

C) ENVIRONMENTAL AND BEHAVIORAL FACTORS

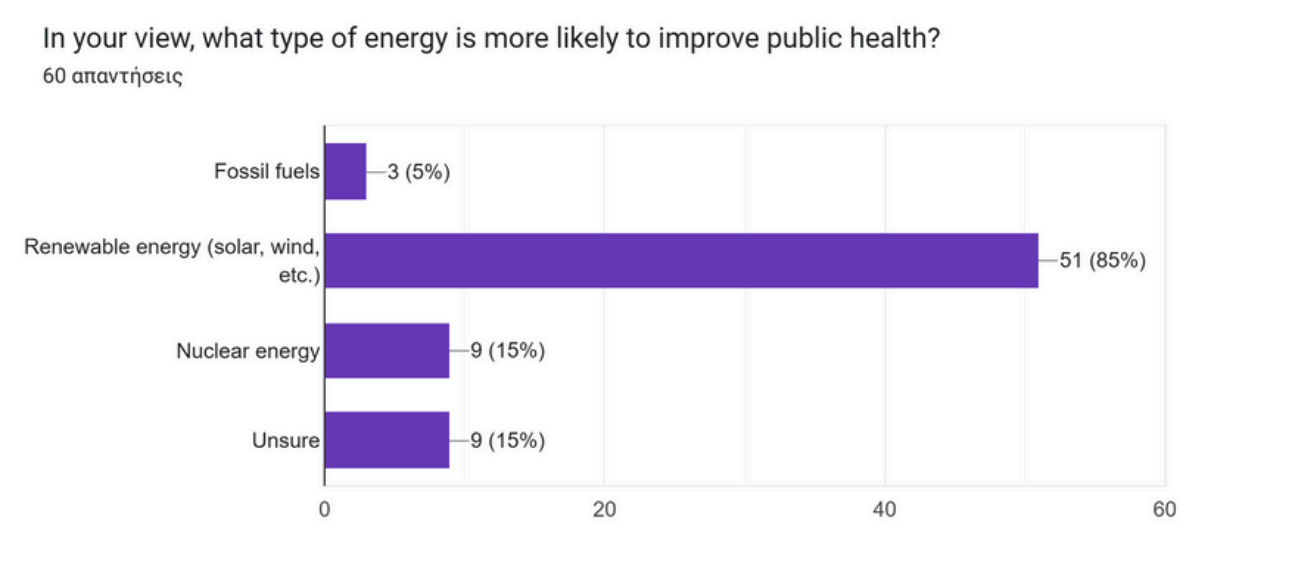
1.How often do you consider the health impacts (e.g., air pollution, stress) when making energy-related decisions (e.g., using less electricity, choosing energy-efficient products)?



In the question "How often do you consider the health impacts (e.g., air pollution, stress) when making energy-related decisions (e.g., using less electricity, choosing energy-efficient products)?", responses reveal a moderate level of awareness, but not a consistently strong one. While 40% (24 respondents) chose rating 2, indicating they occasionally consider health impacts, only 18.3% (11 respondents) consider them very frequently (rating 1).

A sizable portion selected mid-range values — 26.7% chose rating 3, and 15% chose 4 — suggesting that for many, health is a secondary rather than primary motivator in their energy decisions. Notably, no one selected rating 5 (never considers health), implying a general acknowledgment of the connection, even if it doesn't always drive behavior. This points to an opportunity for targeted campaigns that highlight how everyday energy choices directly impact personal and community health.

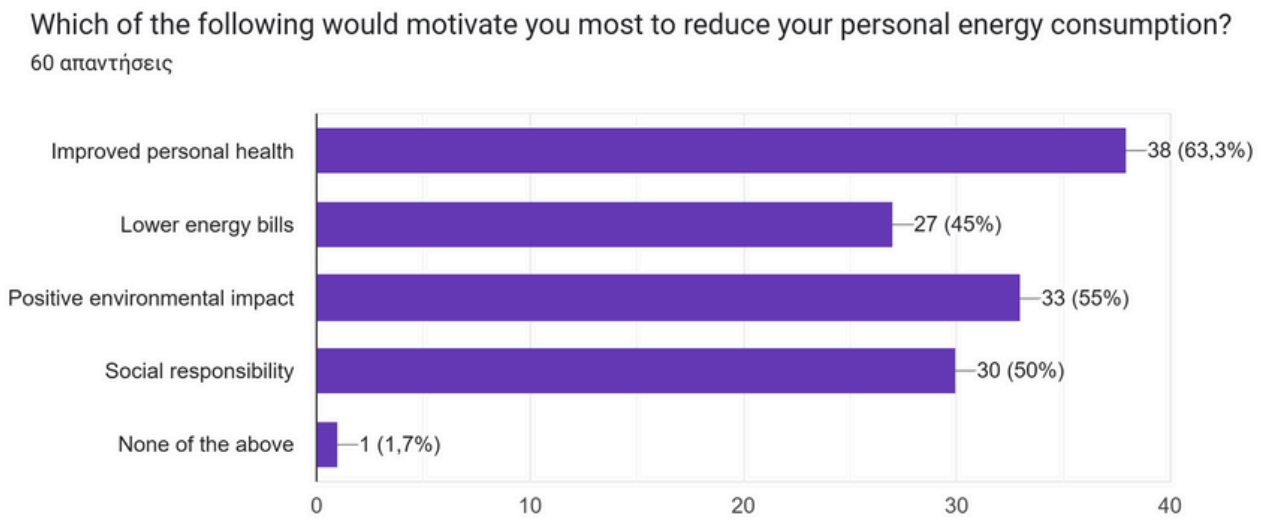
2. In your view, what type of energy is more likely to improve public health?



In response to the question "In your view, what type of energy is more likely to improve public health?", an overwhelming 85% of respondents (51 out of 60) chose renewable energy (solar, wind, etc.), clearly indicating strong public confidence in its health-related benefits. Only 5% identified fossil fuels, and 15% each selected nuclear energy or stated they were unsure.

These results reflect a significant shift in perception toward renewables as a cleaner, healthier alternative—likely due to their non-polluting nature and potential to reduce respiratory illnesses, stress, and environmental harm. The relatively low support for nuclear energy and fossil fuels suggests ongoing concerns over safety and pollution, while the 15% uncertainty highlights a potential area for educational outreach.

3. Which of the following would motivate you most to reduce your personal energy consumption?

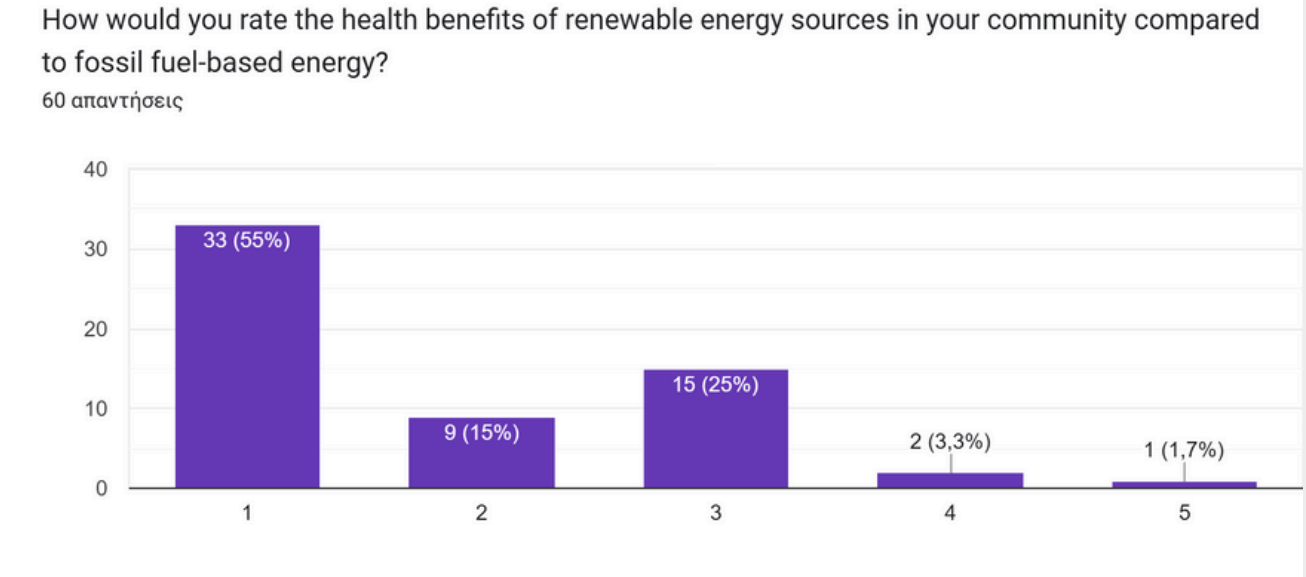


In the question "Which of the following would motivate you most to reduce your personal energy consumption?", the most frequently chosen motivator was improved personal health, selected by 63.3% of respondents (38 out of 60). This was followed by positive environmental impact (55%) and social responsibility (50%), both of which highlight a strong sense of collective and ecological awareness among participants.

Lower energy bills were also a motivating factor for 45%, indicating that financial considerations remain relevant, but secondary to health and environmental values for many. Only 1 respondent (1.7%) indicated that none of the options would motivate them. These results suggest that future campaigns promoting energy-saving behaviors could be most effective when framed around personal health benefits, while also reinforcing the broader environmental and social impacts.

D) COMPARATIVE ANALYSIS

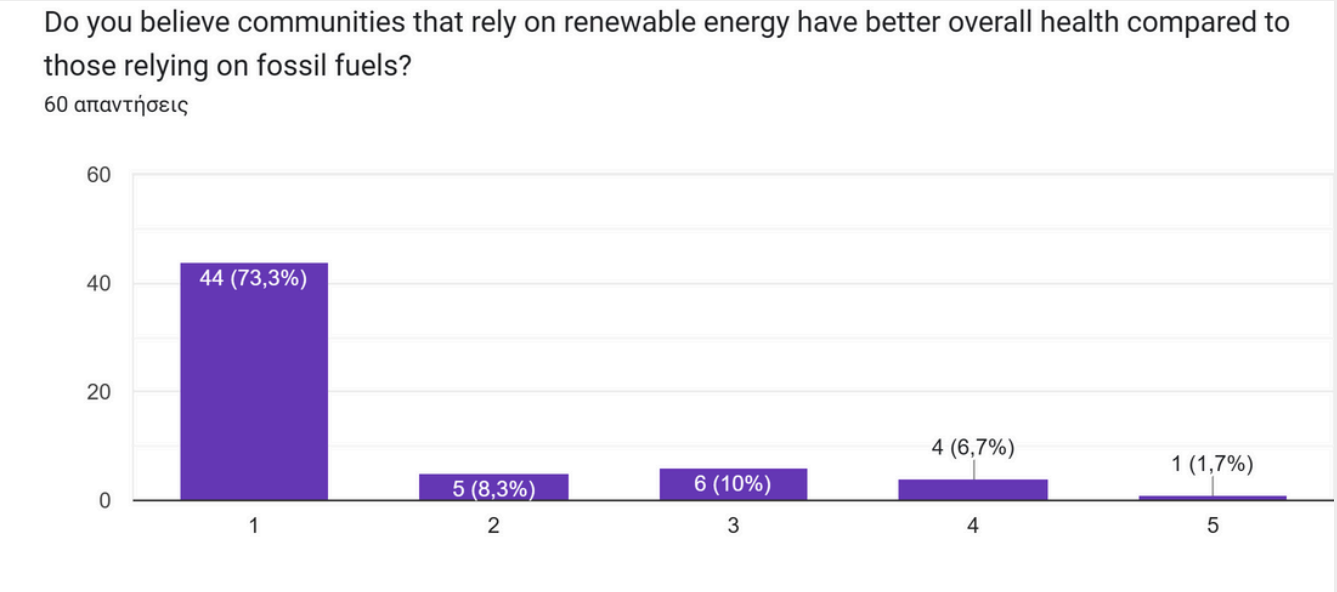
1. How would you rate the health benefits of renewable energy sources in your community compared to fossil fuel-based energy?



In the question "How would you rate the health benefits of renewable energy sources in your community compared to fossil fuel-based energy?", the majority of participants—55% (33 out of 60)—rated the health benefits of renewables at the highest level (rating 1), indicating strong confidence in their positive impact. 25% gave a moderate rating (3), and 15% selected a slightly lower positive score (2), while only a small minority expressed skepticism with ratings 4 (3.3%) and 5 (1.7%).

These results reinforce a clear perception that renewable energy is significantly healthier than fossil fuel alternatives, though a quarter of respondents appear to perceive only moderate or unclear benefits. This gap suggests that while belief in the advantages of renewables is widespread, further visibility of local health outcomes or success stories could help deepen that understanding across communities.

2. Do you believe communities that rely on renewable energy have better overall health compared to those relying on fossil fuels?



For the question "Do you believe communities that rely on renewable energy have better overall health compared to those relying on fossil fuels?", the vast majority of respondents—73.3% (44 out of 60)—strongly agreed (rating 1), expressing clear confidence in the health advantages of renewable energy-based communities. Smaller portions selected ratings 2 (8.3%) and 3 (10%), suggesting moderate agreement or uncertainty.

Only 6.7% (4 respondents) leaned toward disagreement (rating 4), and 1.7% (1 respondent) expressed strong disagreement (rating 5). These results reflect a strong collective perception that the adoption of clean energy sources contributes to healthier living environments, likely influenced by awareness of reduced air pollution, improved air quality, and lower exposure to harmful emissions in renewable-focused regions.

National Insights

Questionnaire Results by Country

All partners within the SHIELD consortium contributed to disseminating the questionnaire and collecting responses within their local communities. The collected data was then aggregated, analyzed, and shared among the partners:

- Greece (Lead Partner – University of Western Macedonia)
- Croatia (DRVO – Association for Sustainable Social Development and Volunteerism)
- Bulgaria (Foundation Korenyak)

While the survey results are presented collectively, certain response patterns and nuances reveal how each national context shapes youth perceptions and behaviors in relation to the energy-health nexus. Below is a breakdown of national-level insights as they emerged during analysis and reflective partner meetings.

Greece

University of Western Macedonia

General Profile & Reach:

The Greek partner gathered responses primarily from students and youth living in Western Macedonia, a region historically shaped by lignite mining and fossil fuel dependency. This background strongly influenced the results.

Key Insights:

- Greek participants showed the highest concern for the negative health impacts of fossil fuels, with over 70% selecting the most negative rating.
- There was a notable awareness of mental health impacts related to energy pollution, with stress and eco-anxiety appearing frequently in open comments.
- The need for accessible educational resources was emphasized more in Greece than other countries, highlighting a gap in formal environmental education.
- Cost was repeatedly mentioned as a barrier to accessing renewable energy—reflecting the economic complexity of energy transition in post-coal communities.

Engagement Level:

Advanced – participants demonstrated high awareness and sensitivity to environmental-health issues, shaped by the region's energy legacy.

Croatia

DRVO (Križevci)

General Profile & Reach:

The Croatian responses came from the Koprivnica-Križevci area and surrounding youth communities involved in DRVO's sustainability and volunteerism activities.

Key Insights:

- Participants showed a balanced mix of awareness and curiosity, with strong interest in learning more about the energy-health relationship.
- Mental health concerns were less explicitly acknowledged than in Greece but still present; the social aspects (peer pressure, lack of local role models) were more frequently cited.
- Croatian youth emphasized the lack of community support and incentives for energy-saving behaviors, suggesting the need for grassroots mobilization.
- Renewable energy was viewed positively, but with skepticism regarding actual implementation at the community level.

Engagement Level:

Developing – respondents demonstrated environmental sensitivity but pointed out a lack of structured opportunities to act on it locally.

Bulgaria

Foundation Korenyak (Sofia)

General Profile & Reach:

Participants were primarily urban youth and students from Sofia, many involved in Korenyak's programs on civic participation and education.

Key Insights:

- Bulgarian respondents placed a greater emphasis on education and social responsibility as motivators for behavior change.
- Awareness of renewable energy options was noticeably lower, with many stating they were not aware of clean alternatives in their region.
- Mental health anxiety tied to environmental issues was moderate, though many acknowledged feeling overwhelmed by the complexity of climate issues.
- Compared to other countries, there was more focus on the role of government and policy, indicating a politically aware demographic.

Engagement Level:

While youth in Bulgaria are clearly open to change, the responses show a need for stronger connection between national policy and local experience.

CONCLUSION

The results of the SHIELD survey reveal a high level of awareness among young people regarding the health implications of both fossil fuel usage and the transition to renewable energy sources. A clear majority of respondents recognize the negative impact of non-renewable energy on public health—particularly through respiratory and mental health issues—while expressing strong support for renewables as a path to cleaner, healthier communities.

At the same time, the findings highlight substantial gaps in education, access, and motivation, particularly when it comes to understanding how individual and collective actions influence energy and health outcomes.

Equally important are the insights into mental health and eco-anxiety, with many participants expressing stress, worry, or psychological strain linked to the future of the environment and climate change. The survey also confirms that youth are motivated by personal health, social responsibility, and environmental impact, but are often held back by systemic barriers like limited access to resources, lack of incentives, and insufficient community support.

These findings validate the SHIELD project's central premise: that energy and health education must be reimagined through participatory, accessible, and engaging formats, particularly for youth. The data collected will directly inform the next phases of the project by helping tailor educational content and outreach strategies to the specific needs, challenges, and motivators identified in each partner country.

SHIELD

STRATEGIES AND INTERACTIVE LEARNING FOR ENERGY AND HEALTH OPTIMISATION

A2.1 RESEARCH AND DATABASE

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