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Delivering Excellence in Education

Air Quality Research 2024/2025

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MEET THE TEAM :

We are a group of TY students attending Roscommon Community College. Our school is a GRETB school under ETBI. Our school is located in Lisnamult, on the edge of **Roscommon town**.

Our school has completed air quality research over the past 4 years and therefore we decided to investigate student knowledge on the topic this year.

We really enjoyed taking part in this investigation and we all learned a lot from working together **about air quality and the impacts poor air quality can have on human health**.

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Galway and Roscommon Education and Training Board

WHAT IS AIR QUALITY?

Air quality is how we measure how clean or polluted the air is. Monitoring air quality is important because polluted air can be bad for our health—and the health of the environment.

In school, air quality is important because students, staff and visitors to the school breath this air in daily.

Poor air quality particularly effects those with underlying respiratory illnesses such as asthma

Air quality is measured with the Air Quality Index, or AQI. The AQI works like a thermometer that runs from 0 to 500 degrees.

- Burning fossil fuels, such as turf, coal, and natural gas, is the leading contributor to air pollution. The toxic particles emitted by vehicle exhaust further degrade air quality, with significant consequences for health. Pollution is linked to a range of ailments, including asthma, headaches, and other respiratory issues, which can disproportionately affect vulnerable populations such as children.
- In the context of schools, poor air quality not only impacts the health and well-being of students and staff, but it also has a direct effect on teaching and learning. Research shows that air pollution can lead to increased absenteeism, as students and teachers suffer from illnesses related to poor air quality. Frequent absences, in turn, disrupt the continuity of learning, hindering both academic progress and engagement.
- A clean, healthy environment, on the other hand, can significantly enhance the learning experience. When students and teachers are not distracted or debilitated by health problems, they can focus better on lessons and collaborate more effectively. Moreover, a positive, well-ventilated space can contribute to higher levels of concentration, better retention of information, and improved overall classroom productivity. In this way, fostering a healthy environment can lead to better academic outcomes and a more efficient teaching process.
- As Sylvia Thomson notes, “Young people are arguably more susceptible to air pollution than adults, due to their smaller size, developing physiological systems, and closer proximity to car fumes." (Irish Times) This vulnerability makes it all the more critical for schools to address air quality as a key factor in creating an environment conducive to learning. By taking steps to reduce pollution and ensure clean air, schools can help mitigate the negative impact on students' health, support their academic success, and create a more effective teaching environment.

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How poor air quality can affect our future

One of the most significant future effects of air pollution will be an increase on disease and, as a result a higher mortality rate. Short term exposure to air polluted air is that harmful, but prolonged contact is linked to various conditions including respiratory diseases, cancer, birth defects and nervous system damage. WHO estimates that's 7 million people die every year due to poor air pollution and that number will rise in the future if the air quality gets worse.

Traffic Related Air Pollution Around Schools

In Ireland, schools are often located in busy areas where there's a lot of car traffic. This can lead to higher levels of air pollution right outside school gates. Traffic-related pollution is mainly caused by emissions from cars and buses, particularly in the morning and afternoon when parents are dropping off and picking up their kids.

Air pollution around schools is a big concern because children are more vulnerable to its harmful effects. Since children breathe faster and their lungs are still developing, they're more at risk from harmful chemicals like nitrogen dioxide (NO_2) and particulate matter (PM_{10}) found in traffic fumes. Studies have shown that living or spending time near busy roads can increase the risk of asthma, lung infections, and other respiratory issues in children.

This is of particular concern around schools and it is important to be aware of this threat to our most vulnerable stakeholders.

The two main pollutants from traffic that affect air quality near schools are **nitrogen dioxide (NO2)** and **particulate matter (PM10)**. NO2 comes from the exhaust of cars and buses, while PM10 consists of tiny particles from vehicle exhaust, brakes, and tire wear. These pollutants can get trapped in the air close to schoolyards and playgrounds, making it worse for kids who are playing outside.

Research has shown that areas around schools in Ireland can have air quality levels above the recommended limits. A study done in Dublin found that the levels of NO2 near schools were often higher than what the World Health Organization recommends for health. This study highlighted how traffic congestion at certain schools contributes significantly to the poor air quality.

- There are some efforts to improve air quality near schools in Ireland. Some local councils are working to reduce traffic around schools by implementing “School Streets” — areas where traffic is restricted during school drop-off and pick-up times. There’s also growing support for walking and cycling to school, and some schools are promoting “green transport” to reduce car reliance. The Irish government is encouraging more sustainable urban planning and has set policies to reduce emissions and promote cleaner transportation options like electric vehicles.

Experts suggest a mix of solutions to help improve air quality around schools, such as reducing car use near school zones, improving public transport, and using greener technologies like electric buses. Schools could also do more to teach students and parents about the dangers of air pollution and encourage alternative, healthier ways to get to school, such as walking or cycling.

We are lucky to have active Green Schools and Sustainbility programmes in our school and promote Education for Sustainable Development as core value and we recommend other schools to do the same.

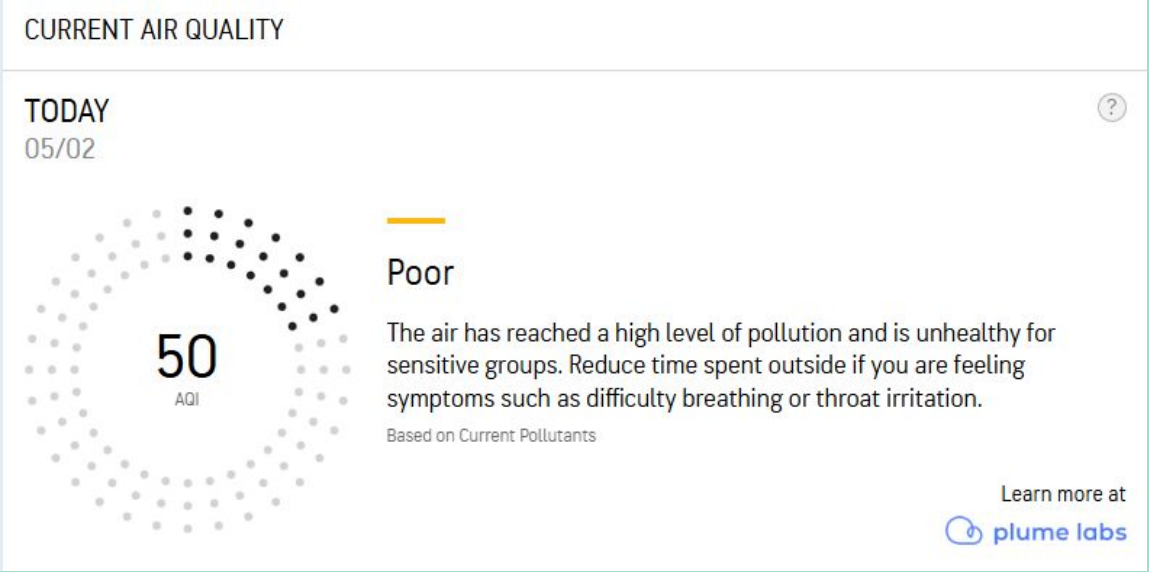
We also have a no parking/idling zone outside main entrances to the school however we feel parents need to adhere to these more.

Traffic pollution not only affects air quality but also contributes to climate change. The cars and buses that create pollution emit **carbon dioxide (CO2)**, which is a greenhouse gas. As part of the European Union's climate goals, Ireland is working to cut CO2 emissions. Reducing traffic near schools could help the country meet these goals while also improving air quality for students.

Urban planning has a major role to play in improving air quality around schools. Cities like Dublin have some high-traffic areas where schools are located right on busy roads. Moving schools to quieter, less polluted areas or redesigning school zones to include more green spaces can help reduce exposure to harmful pollutants however this is not a very practical solution given the shortage of school places and other controlling factors. In comparison, in Roscommon, for example we are lucky as the levels of air pollution, while present, are not of as much threat and concern.

How Climate Change Affects Air Quality around the world

- Because of the current events in Los Angeles we decided to make a slide about how the rising temperature is affecting the air quality for millions in the city of Los Angeles. Not only are the fires forcing people to evacuate, it is also making the air for the residents almost unbreathable.
- The date of when this image was saved is the 5th of February at 01:47 and it was raining which would affect the results. Los Angeles, CA Air Quality Index | AccuWeather is where we got the image.
- Not only are the fires polluting the air they are also burning trees and plants that produce oxygen



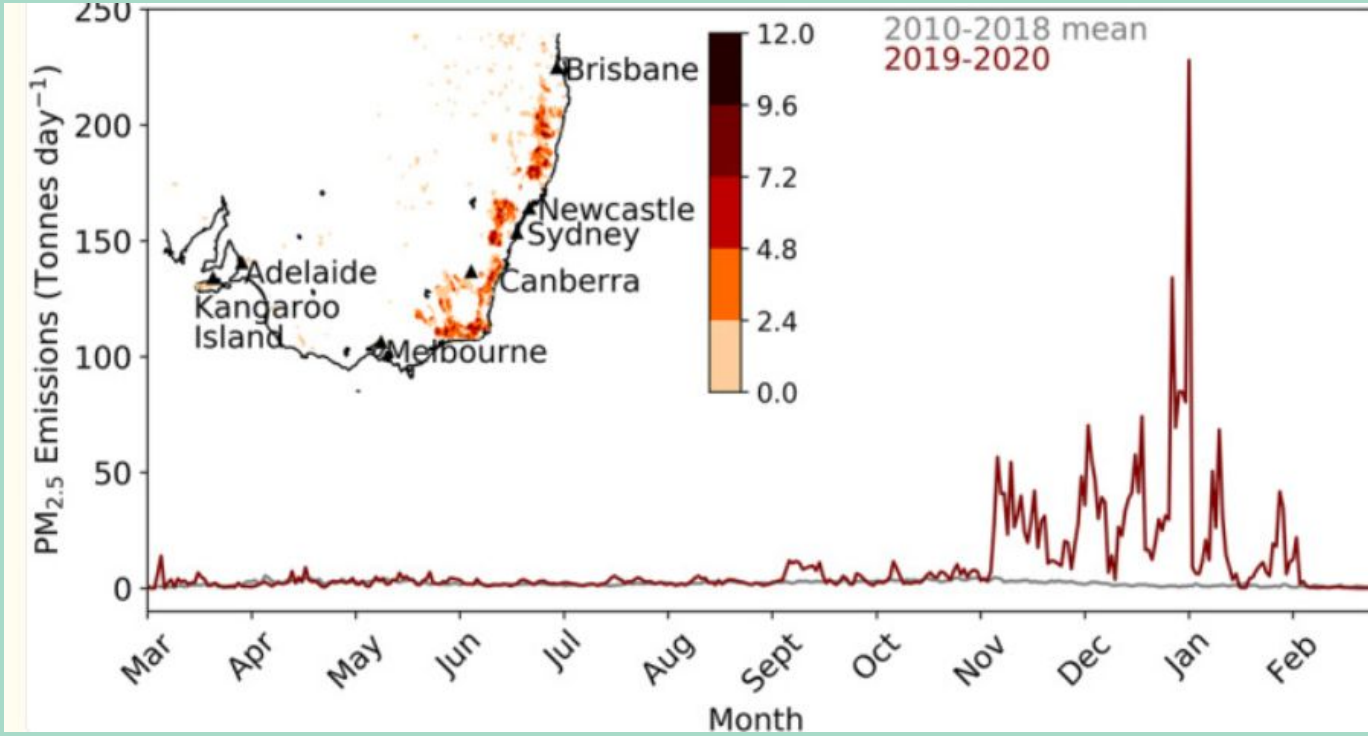
Australian Bushfires

Smoke from the massive bushfires that hit Australia in the 2019-20 summer was linked to more than 445 deaths, a government inquiry has heard.

More than 4,000 people were admitted to hospital due to the smoke, Associate Prof Fay Johnston from the University of Tasmania told the Royal Commission.

The Australian bushfires was one of the worst wildfires in history. The fires destroyed 17 million acres of land and 2000 homes according to the BBC.

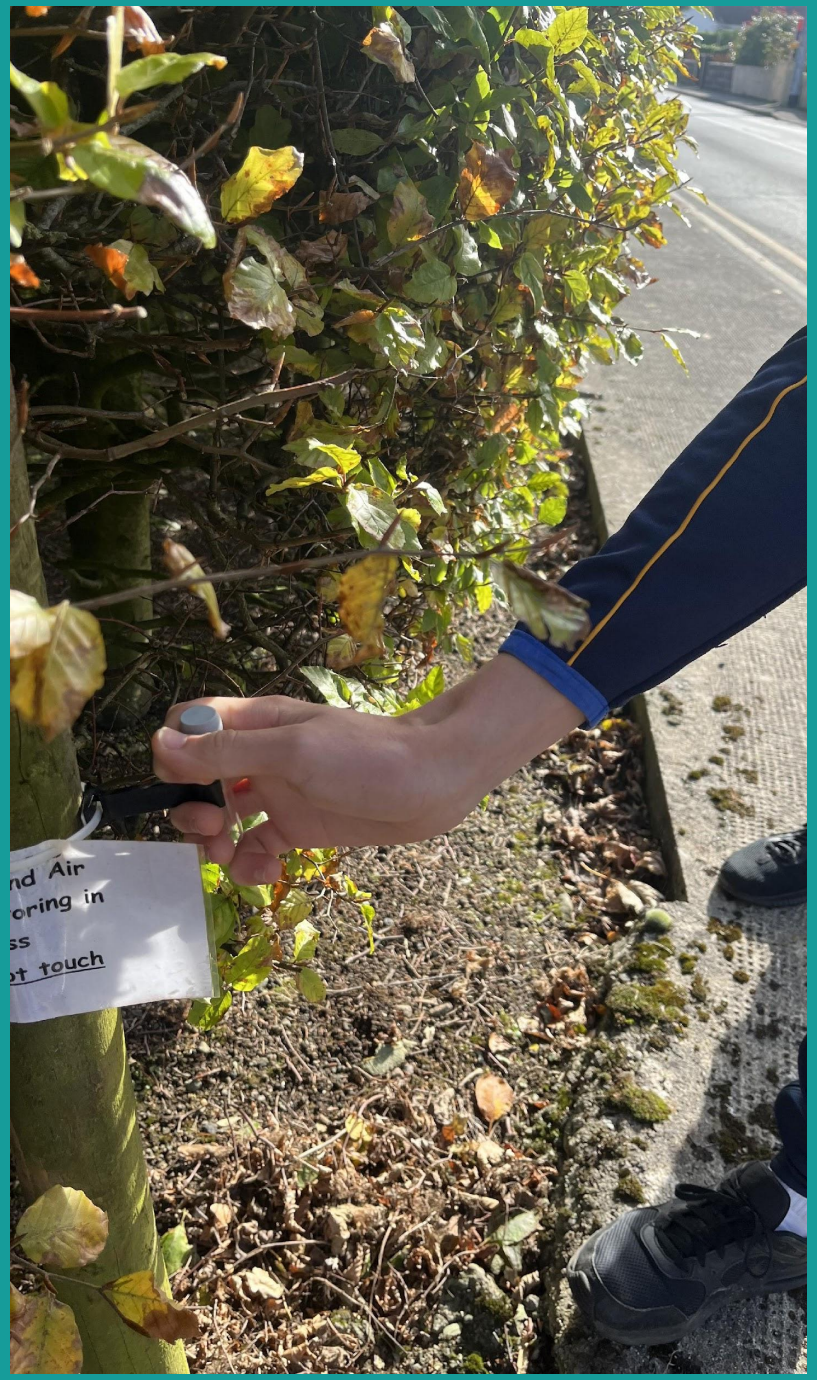
The poor air quality lead to the death of many and many admitted to the hospital with breathing related sickness.



Measuring Air Quality in RCC

- We choose 3 locations around our school and set up our N02 diffusion tubes supplied by GLOBE Ireland to measure the levels of traffic related air pollution around our school.
- TYs in RCC have been participating in this campaign for years so we were excited to see how our results would compare.
- Our school is located on the edge of Roscommon Town in a busy residential area off the Galway Road with a train line to the rear.

1. **A Busy Area:** The main drop off and pick up point at the school gate
2. **A lesser busy area:** The main staff car park
3. **A quieter area:** The Learning for Life Garden at the rear of the modular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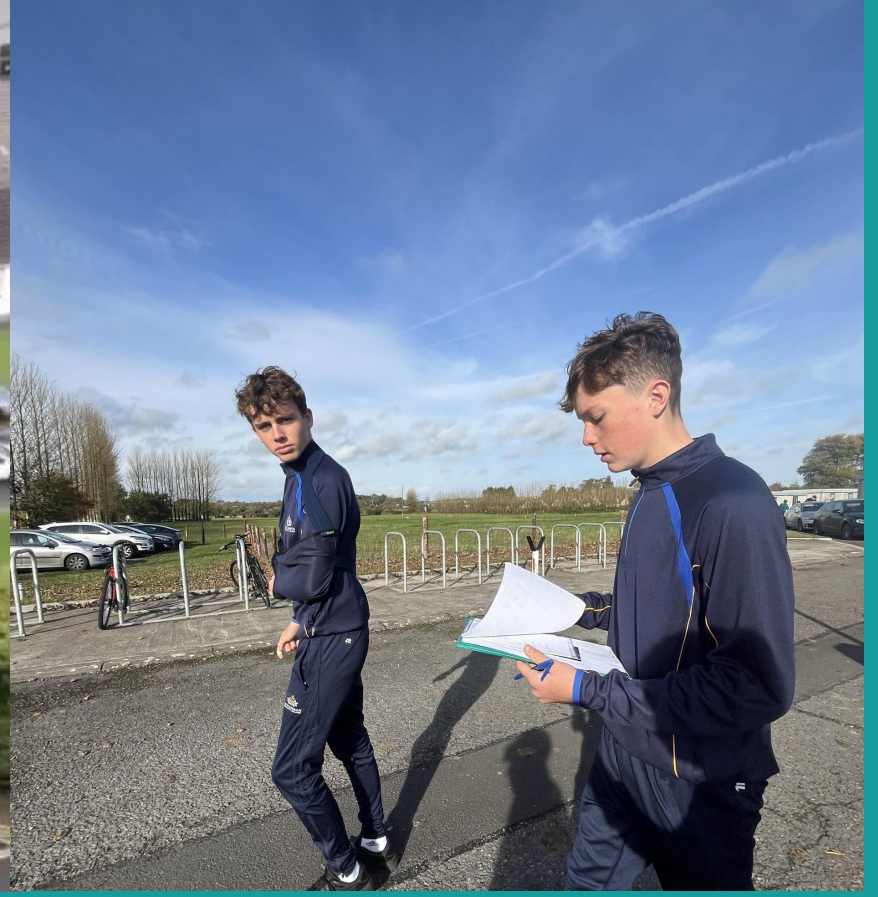

Vehicle observations onsite

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•This year we measured traffic related air pollution (NO_2 levels) over a 4-week period. We chose 3 locations around the school:

- Main staff car park (moderate traffic)
- Main school gate/along road (heavy traffic area)
- LfL garden (remote area)

•During the investigation period, we also conducted traffic observations and vehicle counts. After 4 weeks our test tubes were sent off for laboratory analysis- these were our results!

Our Results:

Roscommon Community College	Moderate_Traffic/Remote_Area	5.51
Roscommon Community College	**Heavy_Traffic**	**7.15**
Roscommon Community College	**Remote_Area**	**4.92**

Reading our results

	Average of NO2 (µg/m3)
Roscommon Community College	**5.86**

WHO & EU Safety Guidelines	Number of schools where NO2 exceeds safe limits		Percentage of schools where NO2 exceeds safe limits	Takeaway
>10 µg NO_2/m^3	Unsafe within a year of constant exposure	57	35.19	More than a third of schools in Ireland (who participated in this campaign) are exposed to NO2 levels above the recommended safety standards of the WHO & EU
>25 µg NO_2/m^3	Unsafe within a day of constant exposure	3	1.85	

Our average result of 5.86 **(µg/m3)** does not exceed the safe limits of NO2 exposure under the recommended safety standards of the WHO and EU

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Sharing the results

- We created an infographic to share our results with our Environmental Studies class.

- We also placed our infographic around our school and on school social media to create awareness about the importance of clean air in schools.

- We shared our research with the CSPE and Environmental Studies Departments in our school.

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Comparing the results over the years in RCC

Air Quality	2021	2022	2023	2024
Student Drop off zone	8.13	7.48	6.61	7.15
Staff car park	5.92	6.71	5.03	5.51
Sheltered area	5.16	0.86	N/A	4.92

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Comparing our results:

- Our school is located 5 minutes from Roscommon CBS.
- This year they also took part in the AQ campaign so we compared the results of the 2 schools as provided by GLOBE.
- They are located closer to the main Galway Road out of the town and we think this influenced their results.
- There is a significant difference in the measures of No2 between our school and the CBS in the heavy traffic area with ours being only 7.15 and theirs being double that.
- Our moderate traffic area was at 5.51 while the CBS was at 8.02
- Lastly our schools remote area was at 4.92 but CBS's was 6.26
- Overall our results seem to have a better outcome due to our school's location

Roscommon Community Coll	Roscom	53.62518095	-8.199733531	2526664	Moderate_Traffic	5.51
Roscommon Community Coll	Roscom	53.62518095	-8.199733531	2526801	Heavy_Traffic	7.15
Roscommon Community Coll	Roscom	53.62518095	-8.199733531	2526803	Remote_Area	4.92

Cbs Roscommon	Roscom	53.6264882	-8.195325754	2526619	Heavy_Traffic	14.30
Cbs Roscommon	Roscom	53.6264882	-8.195325754	2526795	Moderate_Traffic	8.02
Cbs Roscommon	Roscom	53.6264882	-8.195325754	2526807	Remote_Area	6.26

Hypothesis

Does student understanding of air quality and its impacts on health change as we get older?

A comparative investigation between First Year and TY students in our school

Investigative plan:

- Research background information on our hypothesis
- Select 2 year groups to survey based on our research
- Compile a survey on MS Forms
- With teachers' permission, conduct the survey in classes
- Read the result
- Compare the data
- Draw conclusions

Background Research

Upon research we discovered details of a study conducted in India on students' knowledge about air pollution found that older students (aged 15–18) had a much better understanding of the causes and consequences of air pollution compared to younger students (aged 11–14). This is comparable to our selected comparison of First Year and TY students.

In the Indian study, the older group demonstrated a deeper awareness of the relationship between human activities (like burning fossil fuels) and the deterioration of air quality. They were also more familiar with terms such as carbon footprint, climate change, etc and the importance of government regulations to improve air quality.

Source: "Assessment of Knowledge and Awareness of Air Pollution Among Students," *Environmental Education Research* (2017).

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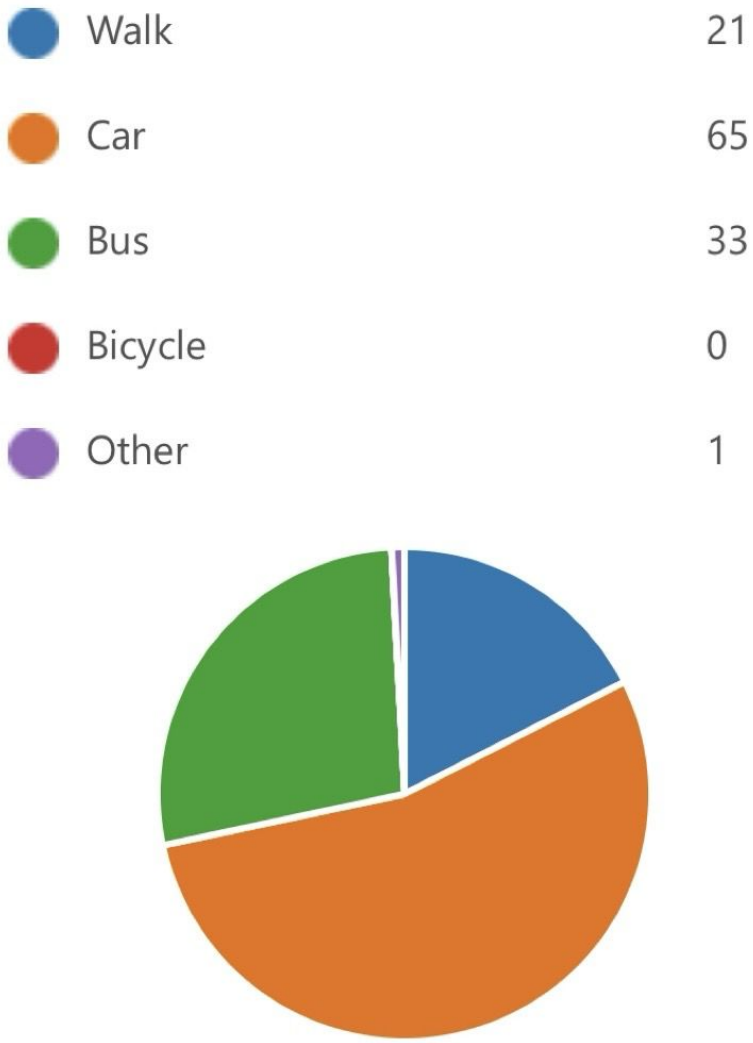
Survey:

- We have designed a comprehensive survey to investigate the knowledge of students on air quality and its effects on health in order to answer our research question. This survey aims to gather valuable insights into how variations in air quality impact different age groups. By examining this correlation between 1st year students and TYs, we aim to gain a deeper understanding of the influences air quality has on teenagers and if the knowledge of air quality changes as we get older.

Question 1.

We asked how students get to school. Majority of students said car.



Question 2

If you travel by vehicle, where do you get dropped off?

A significant number of students who travel by vehicle get dropped off either right by the school or close to the school grounds.

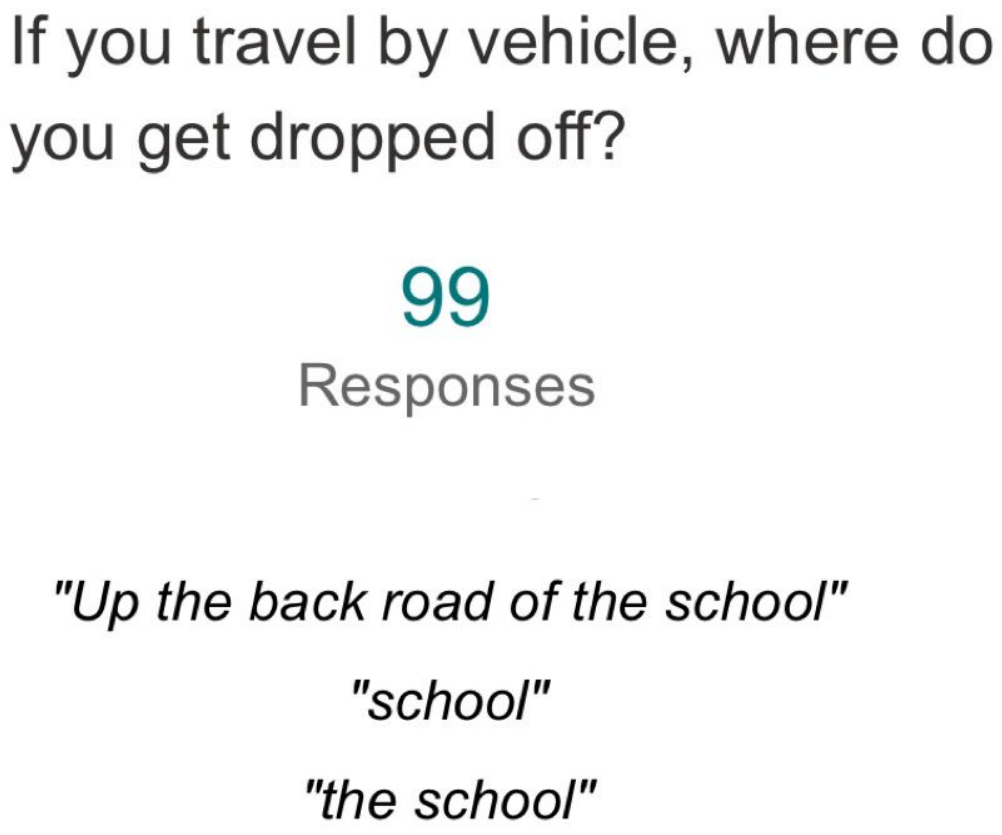
	Responses
	lisnamult estate housing
	The front of the school
	At the school
	park outside the school
	School
	School
	Beach groove
	Lidl
	Outside school
	Train station
	The school
	School
	School gate
	School
	At londis
	School
	At londis
	Outside school
	At the school gate
	Train station
	school
	close tô the gate hesite the pitch
	the church
	In front of school
	At the entrance of Lisnamult
	School
	School
	in front of school sometimes at londis
	library
	Outside the gate

Question 3.

In question 3 we asked "Where do you get dropped off?"

The most common answers were

- The back roads of the school
- The school



Question 4.

In question 4 we asked "have you ever heard of air pollution"

104 said yes and 16 said no.

We found that more transition students said yes than first year students.

Question 5

"Have you ever heard of air pollution ?"

104 said Yes

16 said No

It effects the environment
Not good
It pollutes the air
The type of hair that we exhale and inhale
how good the air is for us to breathe
It is bad
How the air is
Bad air
Nothing
The quality in the air in the atmosphere

Air pollution can be caused by the burning of fossils
Quality of air
That it is not very good
If the air around us is good or not
What the chemical composition of the air is, and how easy it is to breathe it in.
It's bad
It's bad for the air
I don't really know

Idk 🤷‍♀️
It is how clean the air is
Bad
?
its k but could be better
from my understanding air quality is how safe
How good or bad the air is
It needs to be good
Don't know
I don't know
not much

Question 6

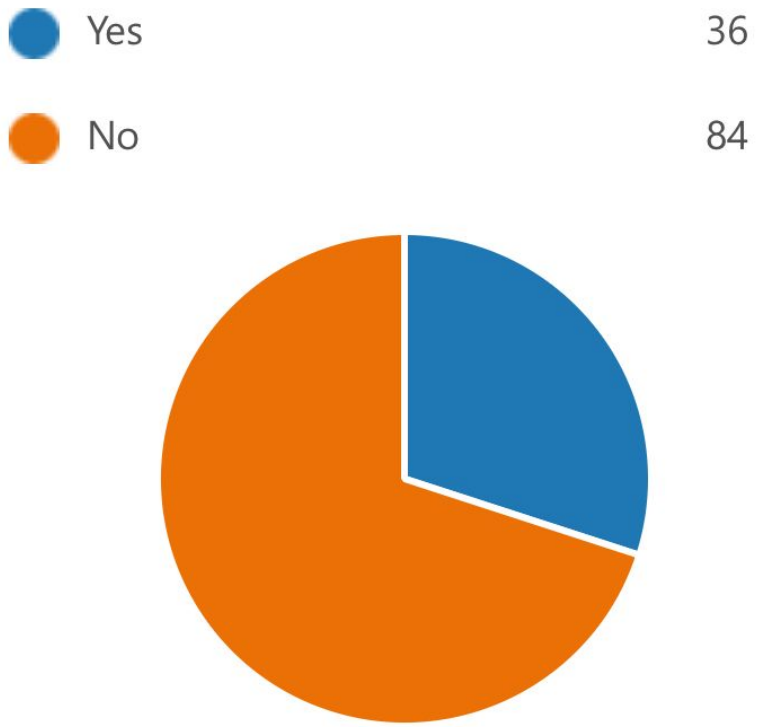
- What is your understanding of air quality ?

From these results, we identified that almost all TY students had a good understanding of air quality.

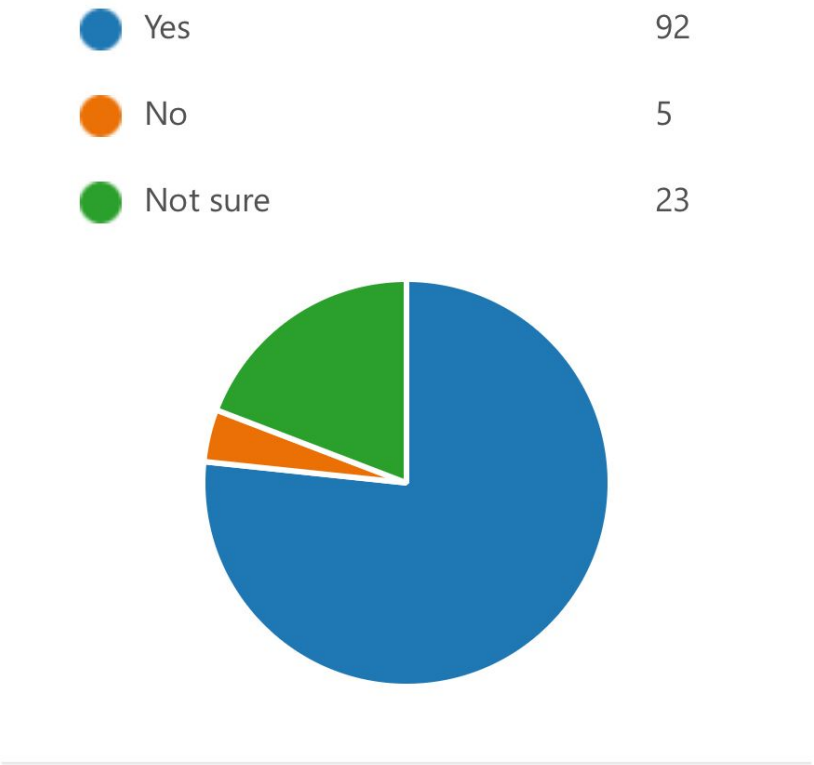
Question 7.

We asked "are you aware that air quality has been investigated in RCC for the last 4 years?"

The majority of students said No.



Question 8.



"Do you think air quality is important?"

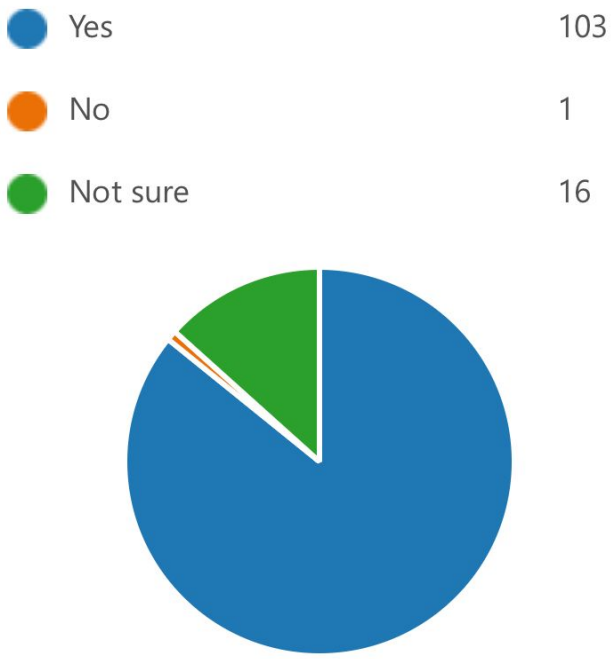
92 said yes

5 said No

23 said unsure

We found more first years said unsure than transition years.

Question 9.



"Do you think it is important to have good air quality here in RCC?"

103 said Yes

1 said No

16 said Unsure

Having good air quality means less health problems in our school and community
Because people can have lung disease
It's good
So that we can breathe in clean air
So we can breath in healthy air
we need to breathe fresh air
If it is bad we suffer
I don't know
So we can breathe better aur
No
So we can get better knowledge about it
So everyone has good air quality
Bad air quality is not good for you

Bad air quality is bad for diseases like asma
I like breathing normally
Idk
As it would benefit our health
Healthier
So people can breathe easier a
It is important not to breathe in polluted air
We need to be able to breathe.
So dude re and teaches can breathe
So we are safe and have safe air to breathe
Yes as there is alot of people in the school
because it's easier to breathe and won't be smug or stuffy

Question 10

- For the following question we asked the students to explain why they thought air quality was important in our school.
- Almost all students who answered believe that having good air quality in our school is important as it hugely affects our health.

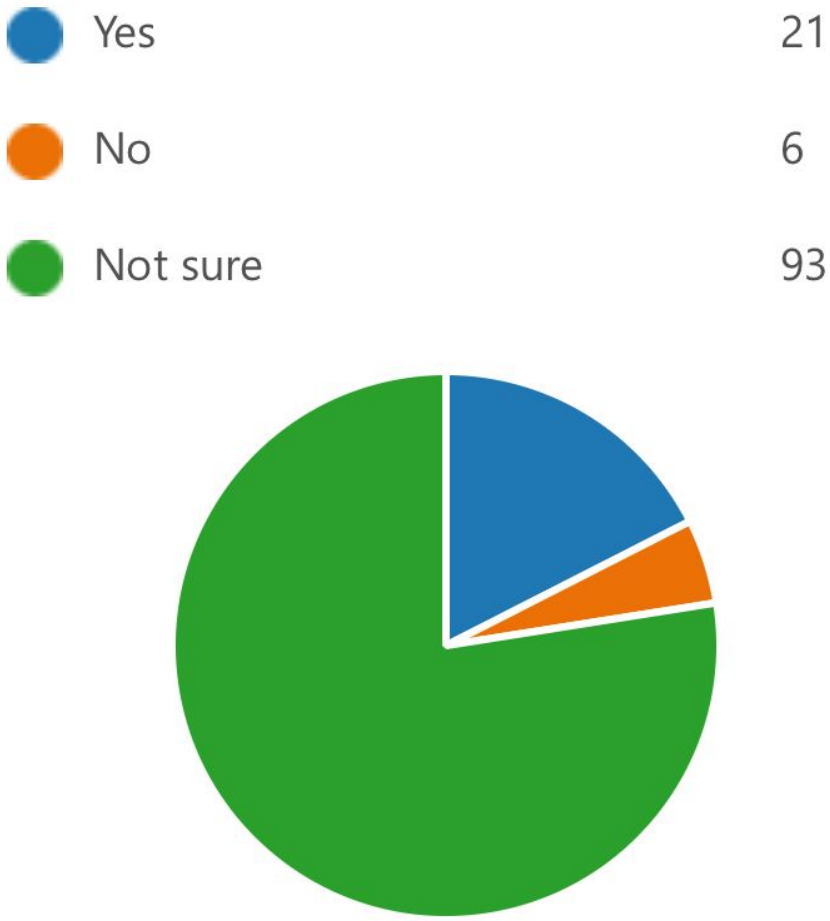
Question 11.

"Do you think air quality has improved in RCC?"

21 said yes

6 said no

93 said unsure



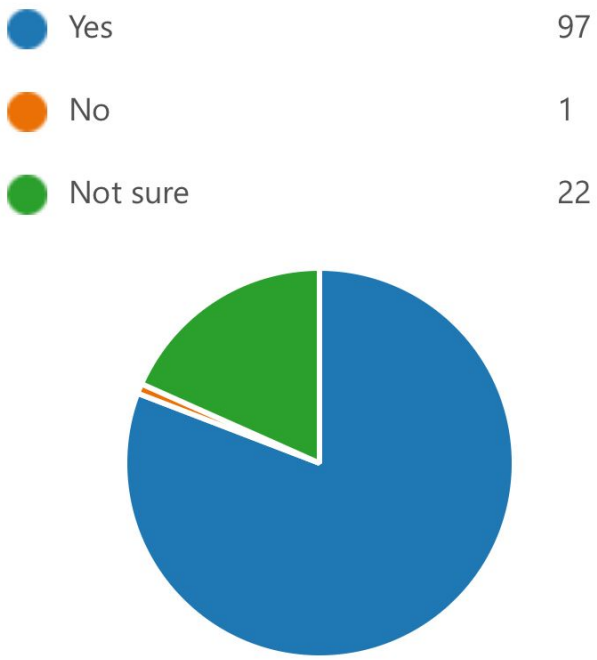
Question 12.

"Do you think poor air quality can have an impact on your health ?"

97 said Yes

1 said No

22 said not sure



Question 13

" How ?, Explain your answer."

Asmtha,lung problems
Asthma
Asthma
Lung Cancer

From looking at the results we could see that the TY students all either said 'Asthma' or 'Lung Cancer'. On the other hand , very few 1st years knew how to answer this question.

Question 14.

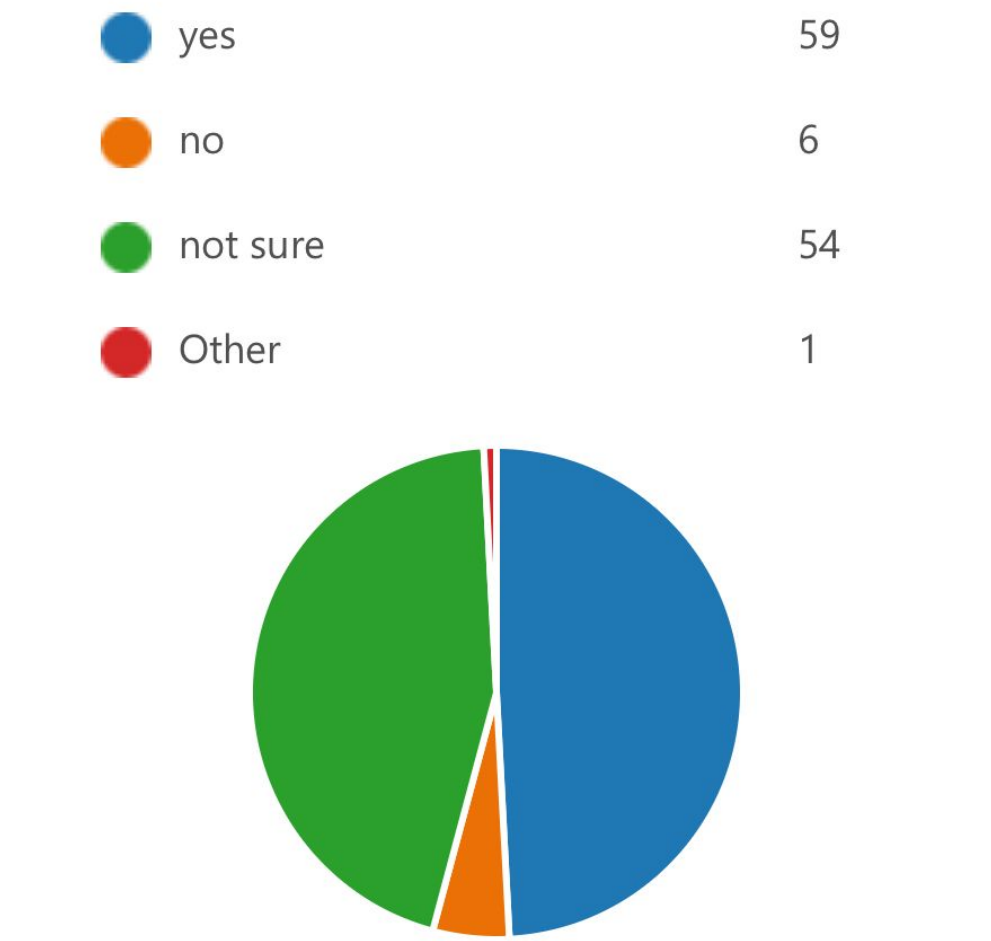
"Do you think the understanding of air quality and the impacts of traffic related pollution on people's health increases with age?"

59 said yes

6 said no

54 said not sure

1 said another answer



Question 15

For the last question we found more transition year students answered correctly than first year students.

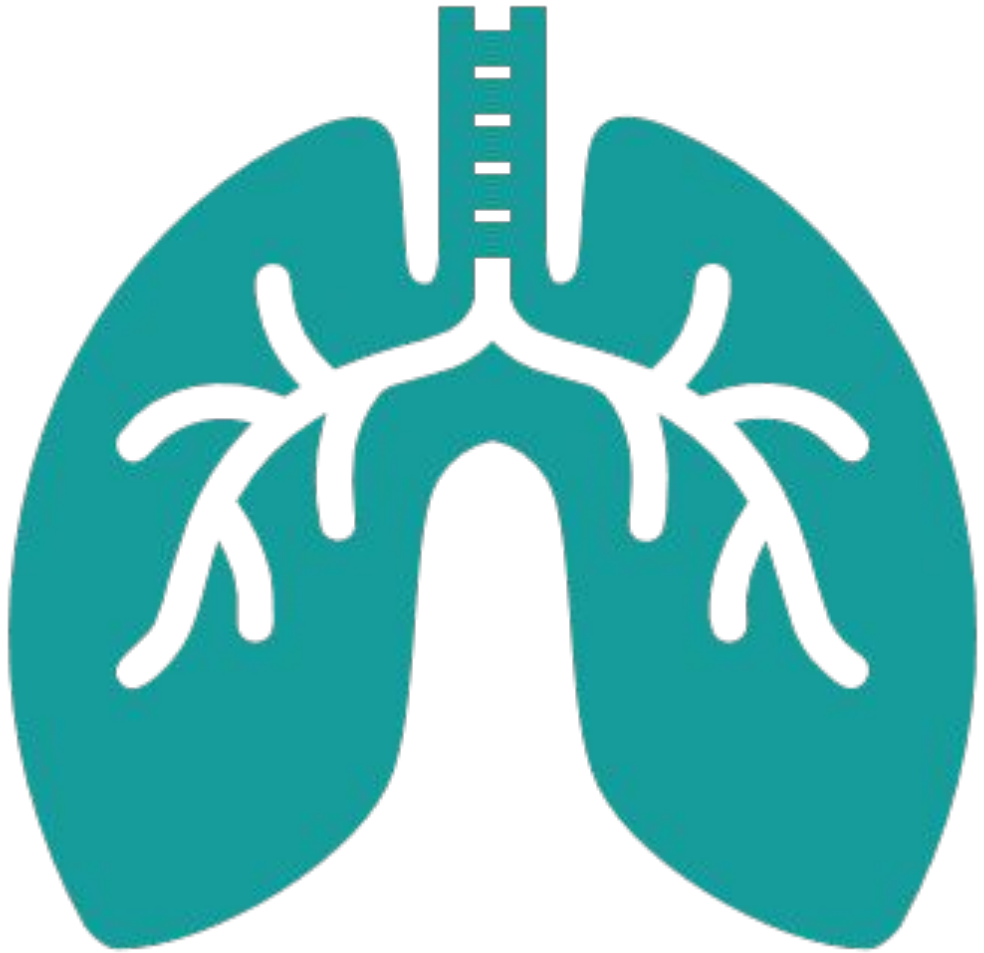
Rank these locations in order of air quality (the top having the best air quality and the last having the worst), in your opinion.

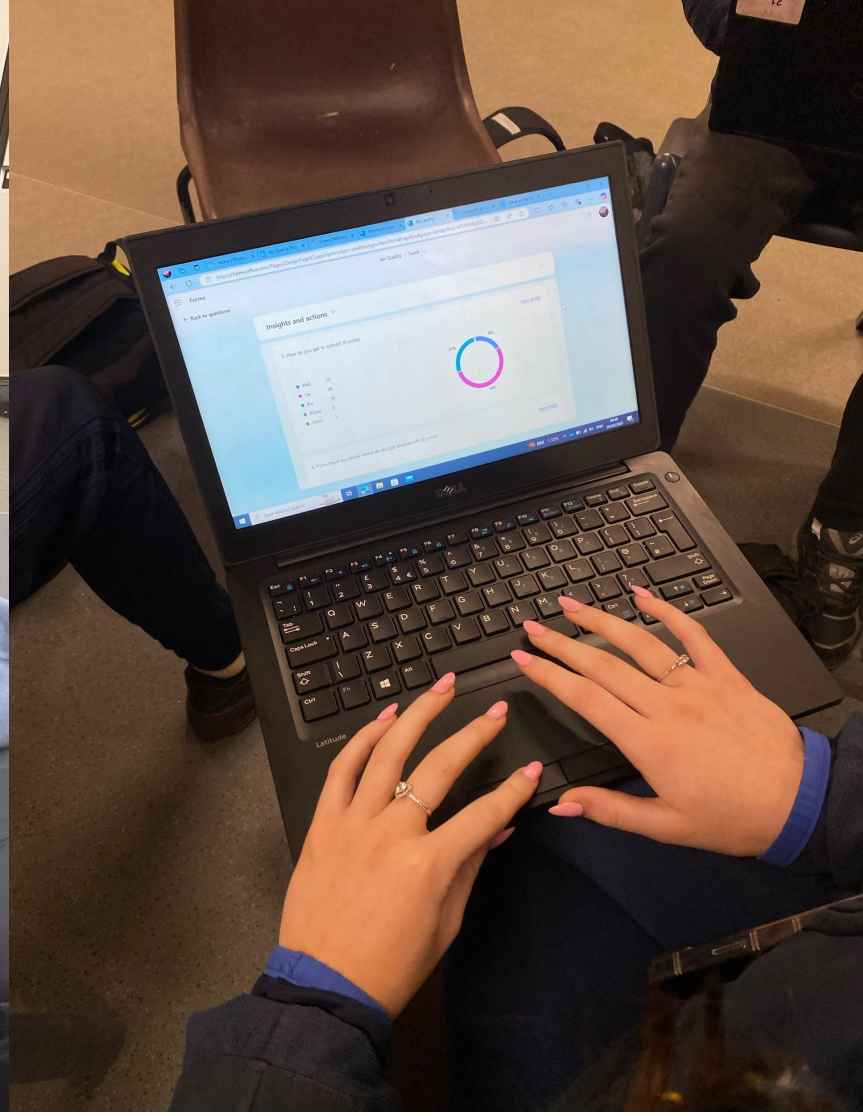
11% of respondents (13 of 120) answered this question correctly.

Back of school	35%
Front gate	45%
Car park	15.8%

How bad air quality can affect asthma

- In our survey we asked can bad air quality have an impact on health. 83% of people said it can have an impact on healthy and an example they gave of poor air quality having an impact on health was asthma.
- Asthma is a condition in which your airways narrow and swell and may produce extra mucus. This can make breathing difficult and trigger coughing, wheezing and shortness of breath.
- Poor air quality can trigger asthma symptoms by irritating the airways, leading to inflammation macus productions, and bronchoconstriction. Common air pollutions like smoke ,dust, pollen, mold, pet dander and vehicle emissions can make breathing difficult. High humidity, cold air and ozone pollution can also worsen symptoms. People with asthma may need to avoid outdoor activities on high-pollution days, use air purifiers indoors, or take medication as prescribed to manage their conditions.





The team at work

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Interview 1: A TY Student

- We interviewed a teenager our age that suffers with asthma and how the air quality around her can affect her asthma.
- **Question 1.** Did you know that air quality can affect your asthma?
- Answer- ' Yes I did know'
- **Question 2.** 'How does poor air quality affect your asthma symptoms?'
- Answer- 'I get very wheezey and my allergies start acting up'
- **Question 3.** Can air pollution like smoke from cigarettes or vapes trigger your asthma?
- Answer - ' Yes being in a place with bad air pollution can make me feel like im about to faint'
- **Question 4.** Have you noticed any improvement in your asthma when spending time in areas with cleaner air quality?
- Answer- 'Yes, I would find it much easier to breathe in a space where the air quality is cleaner rather than a place with poor air quality.'

Concluding Thoughts:

- From our research we found that your understanding of the importance of air quality grows with age. We found this result from conducting our survey. We found that the Transition Year students knew more about air quality and the air quality in RCC than the First Year students did. There are a lot of factors likely responsible for this amongst them being lack of exposure to information on this topic in the curriculum, values and lived experiences.
- In the curriculum at Junior Cycle this topic isn't really explored whereas in TY we do a Chemistry module, and we also now have compulsory Environmental Studies.
- We hope our infographic will be useful for 1st Year students to familiarize themselves with the dangers of air pollution and importance of good air quality.
- If we were to rerun this study again, we would ensure an equal number of respondents from both groups for an equal comparison

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We compared First year and Transition Year knowledge of air quality here in Roscommon Community College. We reviewed all the data we found from doing a survey.

We researched what air quality is, where air quality is good and where it is bad.

We figured that the answer to our research question was yes, the understanding of air quality and its impacts on health changes as we get older. We knew this as very few to no 1st year students understood our questions.

We further tested our hypothesis by conducting interviews with one of our classmates and compared it to the responses to one of our teachers/

Overall, we hope to educate more people about the importance of air quality in our school community and teach people about how air quality can impact your health and effect diseases you may already have e.g asthma.

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Concluding thoughts:

In 2023, a report by the **Irish Heart Foundation** highlighted the harmful effects of air pollution on children's health, particularly those attending schools in high-traffic areas. They noted a direct connection between traffic emissions and childhood asthma rates in urban areas. This has been a major talking point in discussions about creating safer environments around schools.

The Irish government is working to reduce overall traffic pollution in line with its **Climate Action Plan**, which includes measures like improving public transportation and encouraging people to switch to electric vehicles. A major part of this plan is creating more "**low-emission zones**" in cities, which could be expanded to include areas near schools. These zones would restrict the most polluting vehicles from entering certain areas, which could drastically improve air quality around schools reducing the harmful effects of traffic related air pollution.

More research is being done into the long-term effects of traffic-related air pollution on children. Some studies suggest that exposure to traffic fumes during critical development years could lead to lasting health issues, including developmental delays, lower lung function, and increased susceptibility to infections. Understanding the long-term impact is essential for creating stronger regulations around traffic near schools.

Comparing Ireland's situation to other countries is interesting. For example, in some cities in the UK and Europe, schools have implemented "**School Streets**" as a way to reduce air pollution. These initiatives have been shown to be effective at cutting down on traffic-related pollution during school hours and have received positive feedback from school stakeholders. Going forward, looking at what's working in other places could help Ireland move forward with similar initiatives and positive air quality plans.

References

Environmental Protection Agency (EPA) Ireland

"Air Quality in Ireland 2022."

Available at: www.epa.ie

The EPA provides annual reports on air quality monitoring and the levels of various pollutants across Ireland

World Health Organization (WHO)

"Ambient (Outdoor) Air Pollution."

Available at: www.who.int

The WHO offers guidelines and research on the health impacts of air pollution, including traffic-related pollutants like NO2 and PM10.

Irish Heart Foundation

"Air Pollution and Children's Health."

Available at: www.irishheart.ie

This report outlines the effects of air pollution, particularly from traffic, on children's health, and includes studies relevant to Ireland.

Health Service Executive (HSE)

"Air Pollution and Children’s Health: The Impact of Traffic Fumes on Kids."

Available at: www.hse.ie

The HSE explores the links between traffic emissions and childhood asthma, along with other health issues.

Irish Times

"Toxic Air Quality at Schools Could Affect Children’s Health."

Available at: www.irishtimes.com

The Irish Times discusses various studies and reports about air quality in school areas and its implications for children's health.

Dublin City Council

"School Streets Initiative for Cleaner Air."

Available at: www.dublincity.ie

The Guardian

"Electric Vehicles and Their Role in Reducing Air Pollution."

Available at: www.theguardian.com

European Commission

"Climate Action and Emissions Reductions in the EU."

Available at: www.europa.eu

National Transport Authority (NTA) Ireland

"Active Travel: Walking and Cycling to School."

Available at: www.nationaltransport.ie

Public Health England

"Air Pollution: Children's Health."

Available at: www.gov.uk

Images – Google Images

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THANK YOU