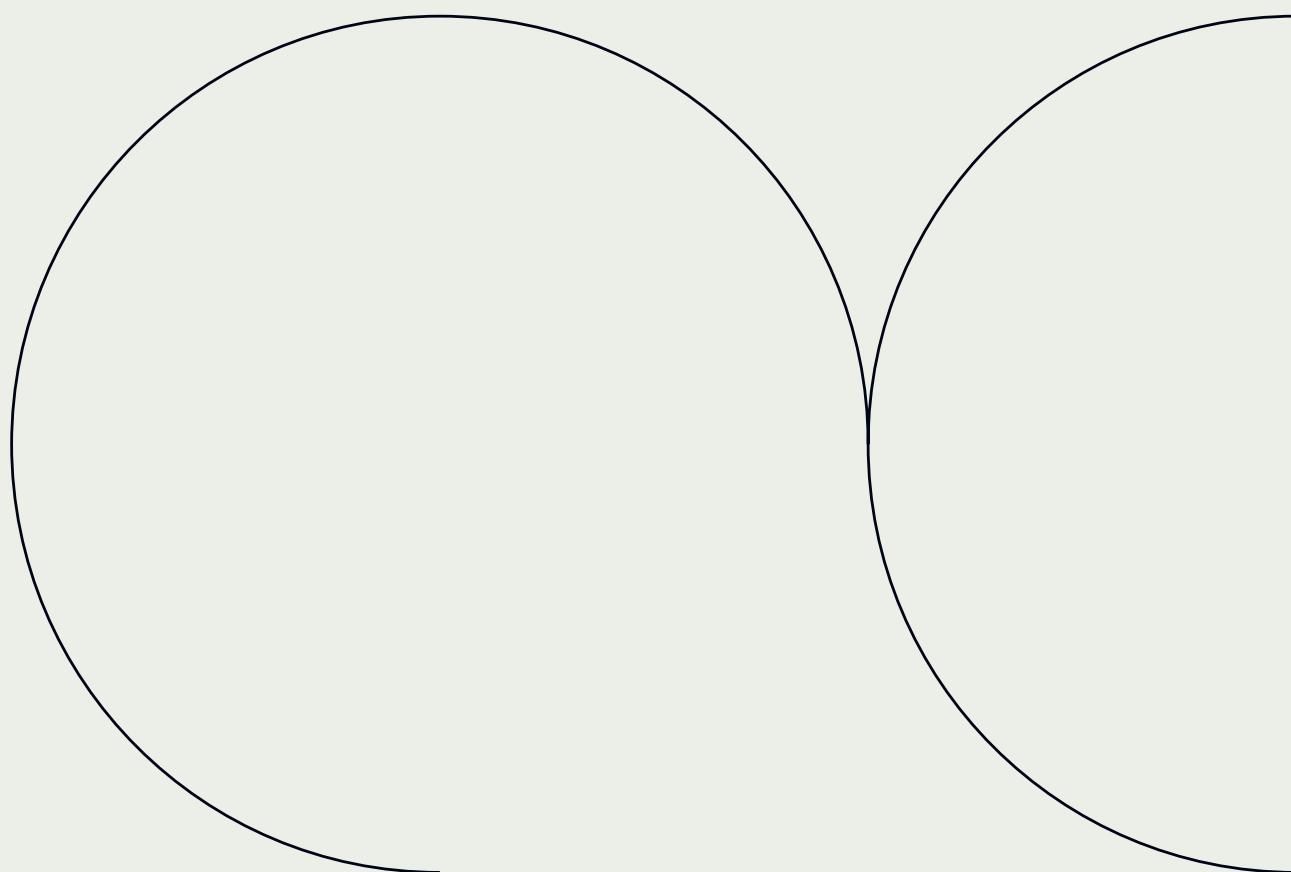


TOWARDS SUSTAINABLE MOBILITY

VERIFIED

HUMAN CENTRED
AND DATA DRIVEN

SOLUTIONS



SELECTED RESEARCH RESULTS

INFOGRAPHICS

Over the three years of the CoMobility project, we have carried out many studies of an interdisciplinary nature. We encourage you to familiarize yourself with selected conclusions – we presented them in the form of infographics so that navigating through the information is enjoyable for you.

If you would like to find out more about our research, please visit the website at the link www.comobility.edu.pl/publikacje/. There, in the Publications, we share information about our scientific articles, reports, and podcasts in which we talk about the results of the project.

If you have any questions, you can also contact us – we will be happy to answer e-mails sent to comobility@uw.edu.pl.

INDEX OF INFOGRAPHICS AND TEAMS INVOLVED IN THEIR PREPARATION

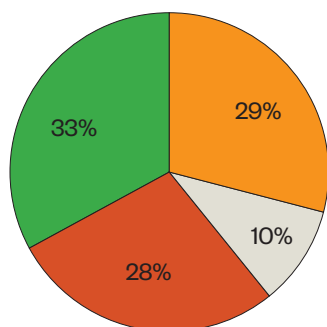
1. **HOW DO VARSOVIANS TRAVEL?**
WARSAW UNIVERSITY OF TECHNOLOGY, UNIVERSITY OF WARSAW
2. **WHAT'S NEW ABOUT THE TRANSPORT PREFERENCES OF VARSOVIANS?**
SGH WARSAW SCHOOL OF ECONOMICS, UNIVERSITY OF WARSAW
3. **HOW DO CHILDREN GET TO PRIMARY SCHOOLS IN WARSAW?**
SGH WARSAW SCHOOL OF ECONOMICS, UNIVERSITY OF WARSAW
4. **WHAT ARE THE REASONS FOR DRIVING CHILDREN TO SCHOOL WITH CARS?**
SGH WARSAW SCHOOL OF ECONOMICS, UNIVERSITY OF WARSAW
5. **DO ALL WARSAW FIRST-GRADERS HAVE EQUAL ACCESS TO SCHOOLS?**
UNIVERSITY OF WARSAW, WARSAW UNIVERSITY OF TECHNOLOGY
6. **HOW TO IMPROVE AIR QUALITY AROUND SCHOOLS?**
NILU, UNIVERSITY OF WARSAW
7. **HOW TO FIND EFFECTIVE SOLUTIONS TO VARIOUS PROBLEMS IN THE CITY?**
"ON SITE" FOUNDATION, UNIVERSITY OF WARSAW
8. **HOW TRANSPORTING CHILDREN TO SCHOOL AFFECTS AIR QUALITY?**
NILU, UNIVERSITY OF WARSAW
9. **WHY IS IT IMPORTANT TO LISTEN TO CHILDREN'S VOICES?**
"ON-SITE" FOUNDATION, UNIVERSITY OF WARSAW

2. WHAT NEW THINGS HAVE WE LEARNED ABOUT THE TRANSPORT PREFERENCES OF VARSOVIANS?

71%

PEOPLE AGED 18+ PREFER A CAR IF THE TRAVEL PARAMETERS ARE THE SAME AS BY PUBLIC TRANSPORT

WE PAY ATTENTION TO THE TIME, PRICE AND QUALITY OF THE TRIP

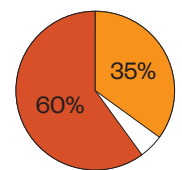


FOUR GROUPS DIFFERING IN THEIR DECLARED PREFERENCES...

... AND ACTUAL CHOICES

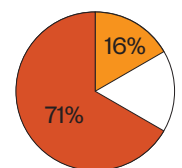
PRO-ECOLOGICAL (33%)

- It is enough for the journey to be 5 PLN cheaper or 15 minutes shorter for them to choose public transport instead of a car
- There is a lot of potential to convince them to use public transport, but it must first and foremost be faster
- They will also be happy to go by bike



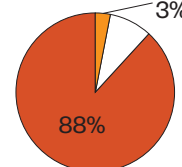
CAR ENTHUSIASTS (28%)

- The journey must be 10 PLN cheaper and 20 minutes shorter for them to choose public transport instead of a car
- They expect speed, but also a seat on a bus or tram (in which case they agree to travel 7 minutes longer)
- They can't imagine traveling by bicycle



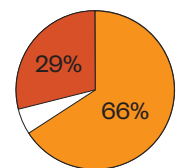
INDIVIDUALISTS (10%)

- They will pay almost 50 zlotys extra and will additionally stand in a traffic jam for half an hour to go by car instead of public transport
- They will gladly choose a bicycle - they expect a road and a parking lot for bicycles

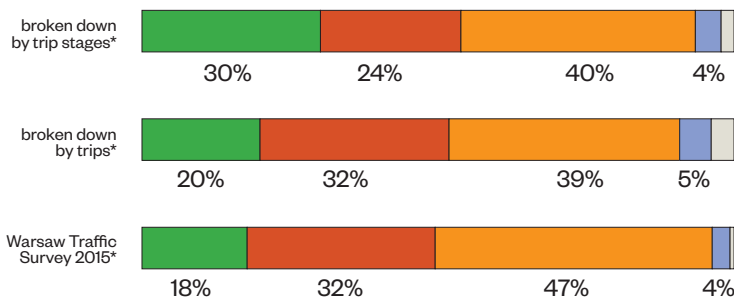
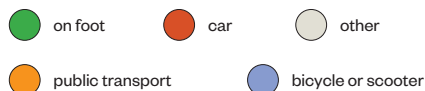


PUBLIC TRANSPORT ENTHUSIASTS (29%)

- They choose public transport, even if it is 5 PLN more expensive or 20 minutes slower than a car
- Despite their fondness for public transport, 29% of them choose a car - probably due to the lack of fast public transport connections on some routes



THE BIGGEST PART PRAGMATICALLY CHOOSES PUBLIC TRANSPORT



PRACTICAL CONCLUSIONS

If we build roads for faster travel, we will drive more cars. If we focus on more frequent and faster public transport, safe pavements and bicycle paths, then we will move in an environmentally friendly way.

METHODOLOGICAL CONCLUSIONS

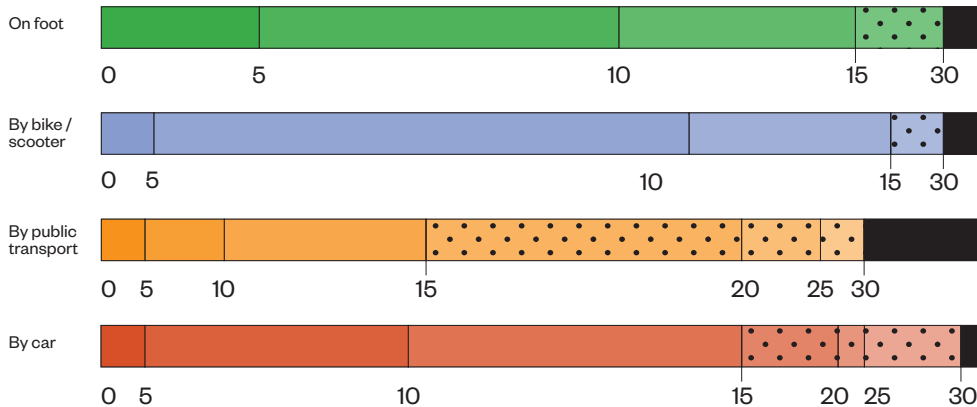
The DCE method allows you to model choices, not just satisfaction. Sometimes, greater satisfaction or the declared importance of a trait does not translate into changes in communication travel behaviour.

3. HOW DO CHILDREN GET TO PRIMARY SCHOOLS IN WARSAW?

49%
JUST WALKING

IF THE SCHOOL IS CLOSE,
A SURPRISING NUMBER OF CHILDREN
GET TO IT ECOLOGICALLY AND ACTIVELY

TIME TO GET TO SCHOOL BY DIFFERENT MEANS OF TRANSPORT
(MINUTES)



10-15min

SCHOOLS SHOULD BE WITHIN SUCH WALKING DISTANCE SO AS NOT TO USE MOTORIZED TRANSPORT

23%
BY BIKE

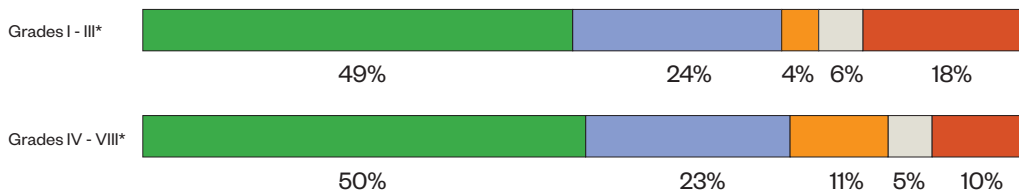
8%
BY PUBLIC
TRANSPORT

6%
OTHER

14%
BY CAR

IN GRADES IV-VIII, THE SHARE OF
PARENTS DRIVING THEIR CHILDREN
TO SCHOOL BY CAR IS DECREASING

WAYS FOR CHILDREN TO GET TO SCHOOL VS GRADE THEY ARE IN



8 percentage points

MORE CHILDREN IN GRADES I TO III GET TO SCHOOL BY CAR COMPARED TO CHILDREN IN GRADES IV TO VIII

PRACTICAL CONCLUSIONS

A deeper analysis of the data indicates that the problem is the poor network of schools in the new districts – the construction of more schools, kindergartens, or nurseries, the conscious choice of their location, and the design of pedestrian-friendly roads should be a priority for the city due to its comprehensive impact, including mobility.

METHODOLOGICAL CONCLUSIONS

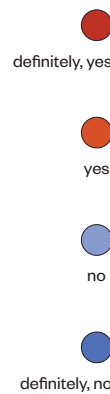
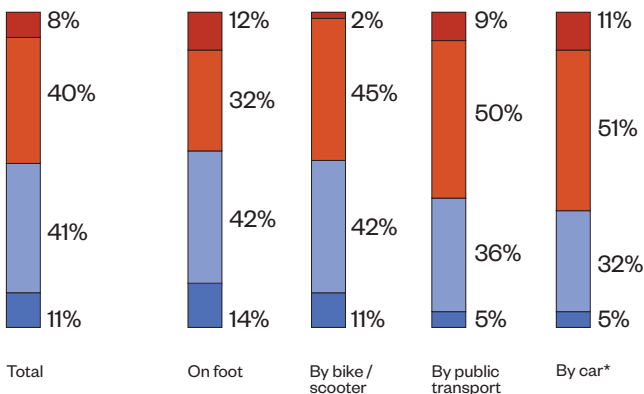
Although the crowd of cars in front of the school may suggest otherwise, our quantitative research shows that the majority of children in Warsaw reach primary school without using a car.

4. WHAT ARE THE REASONS FOR TRANSPORTING CHILDREN TO SCHOOL BY CAR?

72% OF PARENTS BELIEVE THAT CHILDREN SHOULD NOT COMMUTE TO SCHOOL BY CAR

52% OF PARENTS WHO DRIVE THEIR CHILDREN BELIEVE THAT CHILDREN SHOULD NOT COMMUTE TO SCHOOL BY CAR

THERE IS DANGEROUS TRAFFIC AROUND MY CHILD'S SCHOOL
Reviews depending on the mode of transport to school



48%

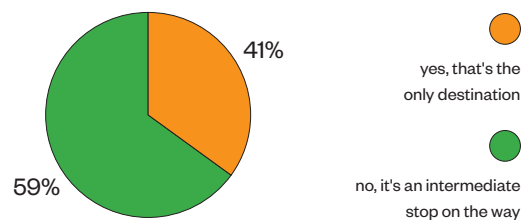
OF PARENTS THINK THAT TRAFFIC AROUND SCHOOLS IS DANGEROUS

62%

OF PARENTS WHO DRIVE THEIR CHILDREN BELIEVE THAT TRAFFIC AROUND THE SCHOOL IS DANGEROUS

IS SCHOOL THE ONLY THE PURPOSE OF THE TRIP BY CAR?

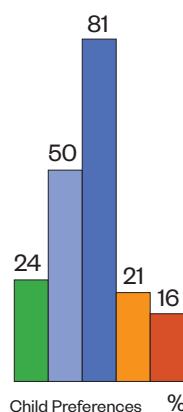
41% OF PARENTS DO NOT DRIVE FROM SCHOOL TO WORK – THEY START THE CAR SPECIFICALLY TO TAKE THEIR CHILD



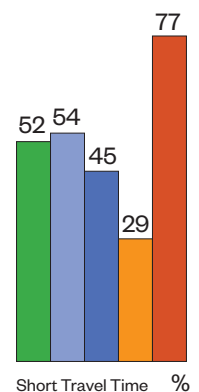
REASONS FOR CHOOSING A MEANS OF TRANSPORT TO SCHOOL (multiple answers possible)



CHILDREN DON'T LIKE TRIPS BY CAR



WE CHOOSE A CAR TO SHORTEN THE TRAVEL TIME, WHICH RESULTS FROM THE DISTANCE TO SCHOOL



PRACTICAL CONCLUSIONS

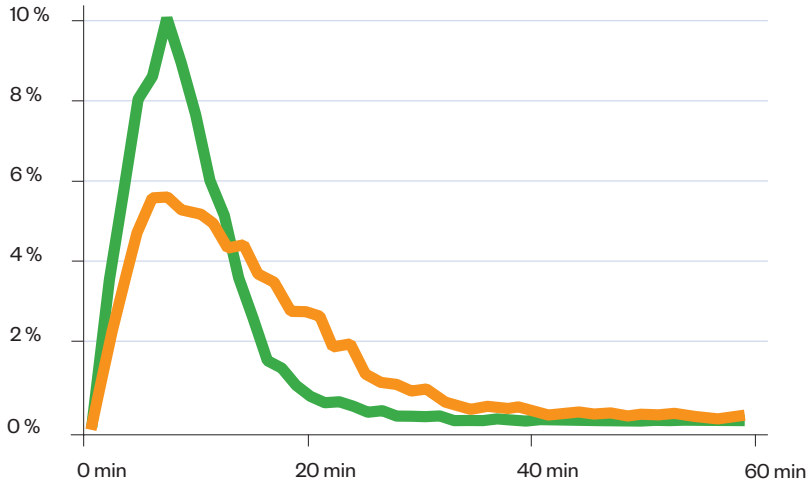
Parents who drive their children to school are afraid of each other. It is worth making an informed decision to break the spiral of fear. If we consider car transport to be necessary, it must not impair the safety of the other children's journey to school. This will increase the number of environmentally friendly trips.

METHODOLOGICAL CONCLUSIONS

Quantitative research enriches our knowledge better if it is accompanied by qualitative research that provides hypotheses for verification and in-depth interpretation. It is worth asking not only about the experience of the journey but also about the beliefs and emotions underlying the decisions made.

5. DO ALL WARSAW FIRST-GRADERS HAVE EQUAL ACCESS TO SCHOOLS?

DISTRIBUTION OF TOTAL DURATION OF PUBLIC TRANSPORT TRIPS TO SCHOOL AMONG FIRST-GRADERS



15 min

IT TAKES 90% OF FIRST-GRADERS IN CENTRAL DISTRICTS TO GET TO SCHOOL OR LESS (●)

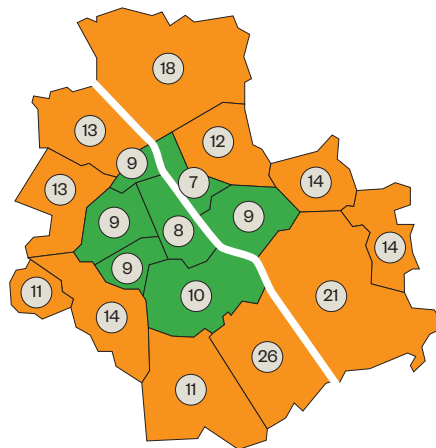
28 min

IT TAKES 90% OF FIRST-GRADERS IN PERIPHERAL DISTRICTS TO GET TO SCHOOL OR LESS (●)

AVERAGE VALUES BY DISTRICT (in minutes)

15½ min

AVERAGE COMMUTE TIME OF FIRST-GRADERS TO SCHOOL BY PUBLIC TRANSPORT IN PERIPHERAL DISTRICTS (●) WARSAW



9⅓ min

AVERAGE COMMUTE TIME OF FIRST-GRADERS TO SCHOOL BY PUBLIC TRANSPORT IN CENTRAL DISTRICTS (●) WARSAW

- peripheral districts
- central districts

PRACTICAL CONCLUSIONS

There is a significant disproportion in access to schools between residents of different parts of Warsaw. In the central districts of Warsaw, the vast majority of students have access to primary school in no more than a dozen or so minutes by public transport (door-to-door). In neighbouring districts, there is a noticeable group of people who take 20-40 minutes to travel. For some people, the choice of a car is the result of a sparse network of schools and public transport connections.

METHODOLOGICAL CONCLUSIONS

Monitoring and building good access to public services (not just schools!) can help cities develop evenly. It will also contribute to sustainable transport behaviour.

Method: Open Trip Planner, school choice algorithm

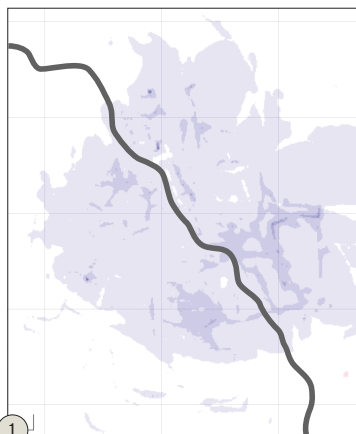
6. HOW TO IMPROVE AIR QUALITY AROUND SCHOOLS?

NOT
COMMUTING
BY CAR

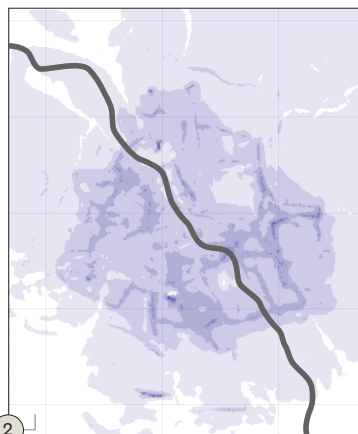
BRINGS THE BIGGEST
IMPROVEMENT
OF AIR QUALITY

WITHOUT
NEGATIVE SIDE
EFFECTS

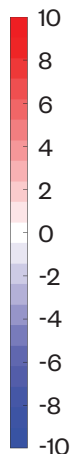
WHAT IF YOUR PARENTS' BEHAVIOR CHANGES*?



1 Parents do not drive their children to and from school by car



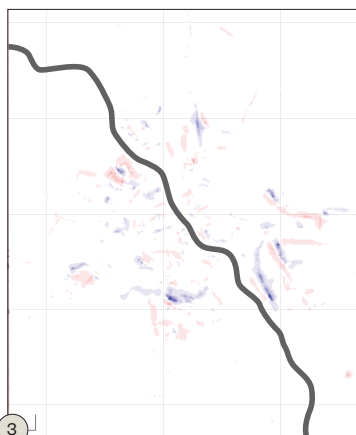
2 Parents who drive their children to school, stop using their cars for all their daily trips



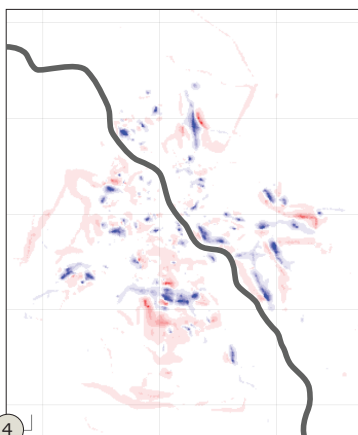
CHANGES IN TRANSPORT BEHAVIOUR IMPROVE AIR QUALITY ACROSS THE CITY, EVEN IF TRAFFIC AT PEAK HOURS DECREASES ONLY BY 10% AT MORNING PEAK HOUR AND BY 3% AT AFTERNOON PEAK HOUR.

% Deterioration (●) / improvement (●) of air quality as measured by the annual average concentration of nitrogen dioxide

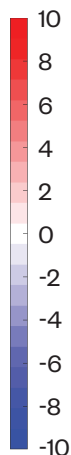
WHAT WOULD HAPPEN IF THERE WERE CHANGES* IN THE ORGANIZATION OF TRAFFIC NEAR SCHOOLS?



3 Reduced capacity of streets near schools and speed limit of 30 km/h



4 Closing school streets to car traffic, but not to public transport



CHANGES IN TRAFFIC ORGANISATION IMPROVE AIR QUALITY NEAR INDIVIDUAL SCHOOLS, BUT SIGNIFICANTLY WORSEN AIR QUALITY IN OTHER PLACES.

AFTER SCHOOL STREETS ARE EXCLUDED FROM THE ROAD NETWORK, CAR DRIVERS CHANGE ROUTES, CAUSING MORE TRAFFIC CONGESTION ON OTHER STREETS. TRAVELLED DISTANCE ALSO INCREASES. THE TOTAL EFFECT OF THE CHANGE IN AIR QUALITY IN THE CITY IS THEN CLOSE TO ZERO.

%

PRACTICAL CONCLUSIONS

Road safety solutions, while necessary to avoid accidents, are not sufficient to improve the air quality at schools and at the city level. It is necessary to change transport behaviour and to take measures to reduce car journeys.

METHODOLOGICAL CONCLUSIONS

Air quality, as well as the functioning of transport systems, can be modelled. Air quality modelling allows us to analyse the effectiveness of both individual actions and groups of projected actions to improve air quality. This allows us to make better decisions when implementing solutions.

7. HOW TO FIND EFFECTIVE SOLUTIONS TO VARIOUS PROBLEMS IN THE CITY?

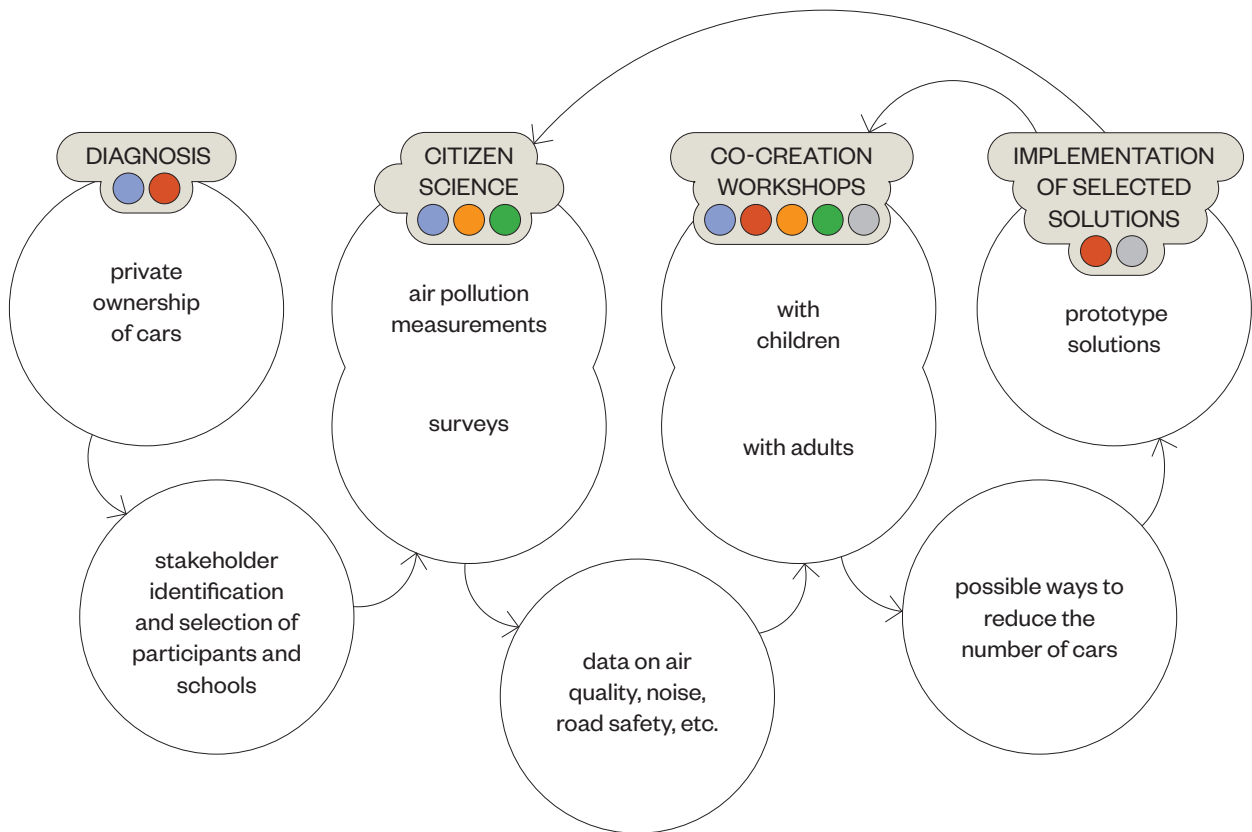
GOOD PLANNING OF THE CHANGE PROCESS

AND INVOLVEMENT OF ALL STAKEHOLDERS AT EACH STAGE OF THE PROCESS

IS CRUCIAL FOR THE EFFECTIVENESS OF THE IMPLEMENTED SOLUTIONS

URBAN LABORATORIES

- Universities/ Non-governmental organisations
- Local governments
- Students
- Primary schools
- Other institutions



WE INCLUDED THE CHILDREN (●) IN THE PROCESS OF FINDING SOLUTIONS, THANKS TO WHICH WE TOOK INTO ACCOUNT THEIR KNOWLEDGE AND NEEDS

THE ROLE OF UNIVERSITIES OR NON-GOVERNMENTAL ORGANISATIONS (●) CAN BE TO DESIGN AND TO COORDINATE SUCH ACTIONS

PRACTICAL CONCLUSIONS

In the city laboratories, we learned, among other things, that children like to ride a scooter to school the most. Walking is also attractive for them, but the way to school should be interesting. We recommend placing various attractions near schools, e.g. games painted on sidewalks and playgrounds. So far, such solutions have very rarely been intentionally used in practice.

METHODOLOGICAL CONCLUSIONS

The proposed scheme allows for efficient management of conflicts of interest and maximizes social acceptance of the implemented solutions. It combines the advantages of data-driven decision-making and participation.

8. HOW DOES DRIVING CHILDREN TO SCHOOL AFFECT AIR QUALITY?

THE NITROGEN DIOXIDE POLLUTION WE HAVE CALCULATED IN THE VICINITY OF SCHOOL ENTRANCES IS HIGHER AT THE TIME WHEN CHILDREN ARE BROUGHT TO OR FROM SCHOOL

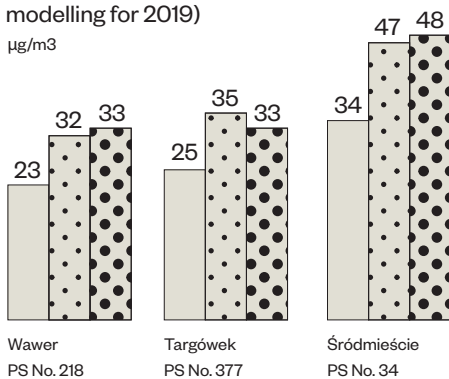
8-16%

OF THE ANNUAL NITROGEN DIOXIDE CONCENTRATION COMES FROM DRIVING CHILDREN TO AND FROM SCHOOL

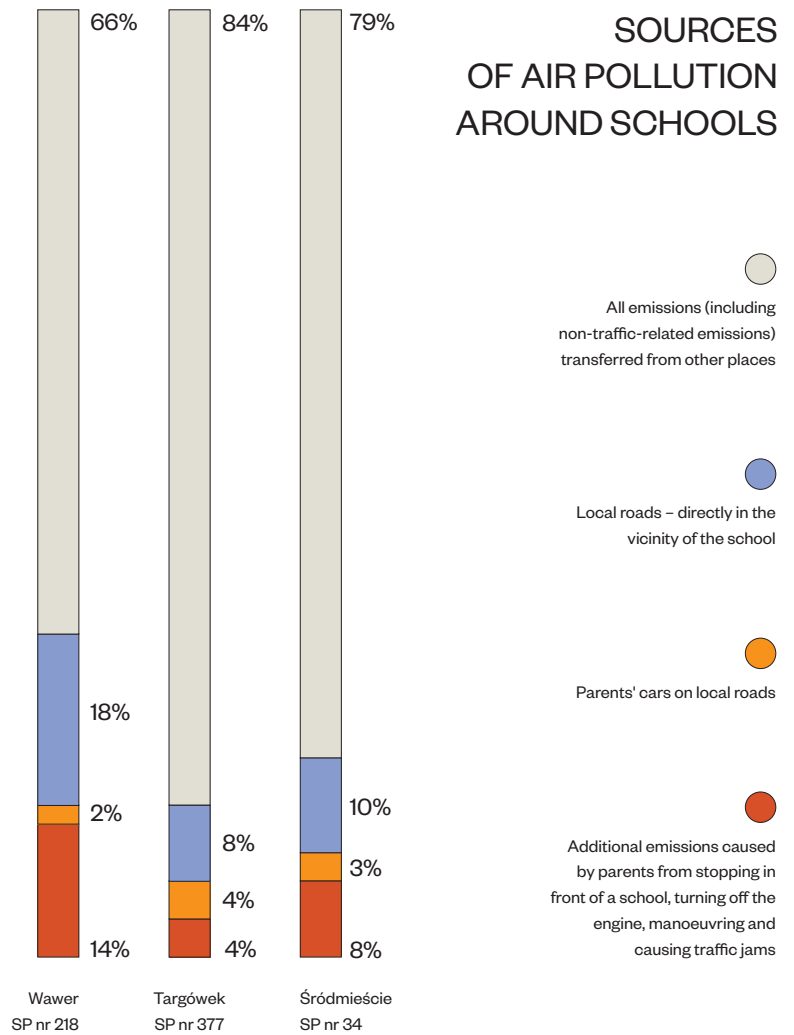
4-14%

OF ADDITIONAL EMISSIONS CAUSED BY PARENTS. ACTIONS THAT MOST CONTRIBUTED FOR THESE ADDITION, WERE IDLING AND PROVOKING CONGESTION IN THE SCHOOL STREETS

LEVEL OF NITROGEN DIOXIDE AIR POLLUTION AROUND SCHOOLS (based on environmental modelling for 2019) $\mu\text{g}/\text{m}^3$

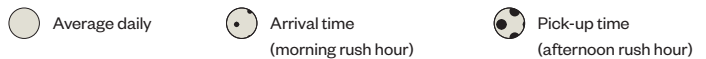


SOURCES OF AIR POLLUTION AROUND SCHOOLS



34 $\mu\text{g}/\text{m}^3$

FROM ENVIRONMENTAL MODELLING CONDUCTED FOR THREE SCHOOL SURVEYS SHOWS THAT THE LEVEL OF AIR POLLUTION WITH NITROGEN DIOXIDE IS HIGHEST AT THE ENTRANCE TO PRIMARY SCHOOL NO. 34 ON KRUCZKOWSKIEGO STREET



PRACTICAL CONCLUSIONS

Moving parking spaces away from schools (decrease congestion) and turning off the engine when parked are two effective ways to reduce air pollution (nitrogen oxides) around schools.

METHODOLOGICAL CONCLUSIONS

By monitoring air quality and transport behaviour, we have been able to estimate and make parents aware of the increase in pollution as a result of parking at school or leaving the engine running when parked.

Method: Environmental modelling

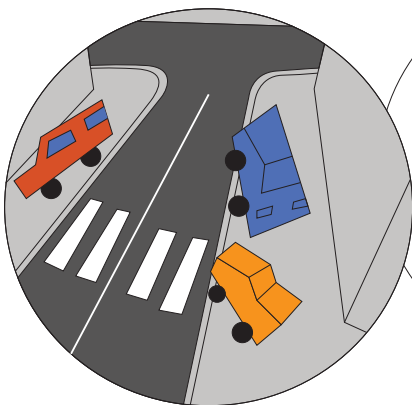
INVOLVING CHILDREN IN CONDUCTING RESEARCH AND PROPOSING CHANGES IS VALUABLE AND IMPORTANT TO US

WE WANT CHILDREN TO BE EXPERTS AND INITIATORS OF CHANGES INTRODUCED IN THE CITY, BECAUSE THEY HAVE A UNIQUE PERSPECTIVE ON THE CITY

In CoMobility, the role of researchers was played by students, children aged 8-12

What did they research?

- They evaluated the public space around their schools – whether it was green, friendly, well-lit, safe
- They collected and analysed traffic and environmental data, e.g. by deploying air quality sensors in the vicinity of schools
- They formulated important questions for their area

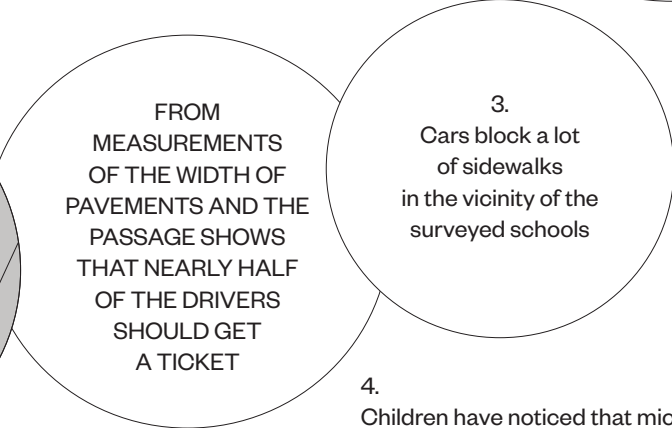
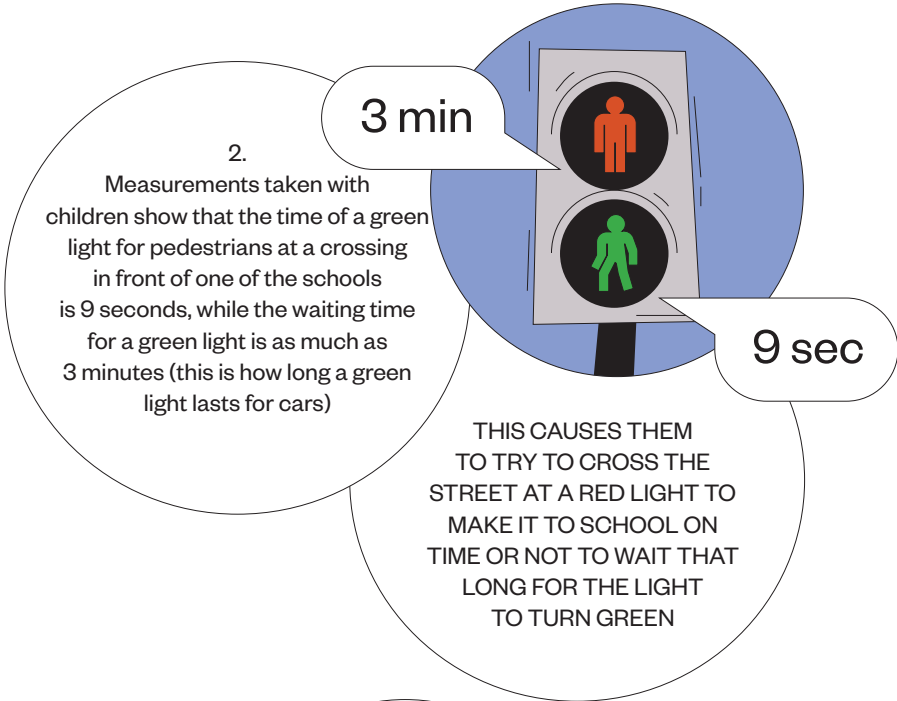


SELECTED METHODOLOGICAL CONCLUSIONS

Adapting research tools accordingly competence of children allows you to collect reliable data that can be analysed by professional researchers.

SELECTED PRACTICAL CONCLUSIONS

1. Crossing the road is a key challenge and barrier in the daily commute to school. Parents don't want their children to get there on their own if they have to cross a busy or dangerous street on the way.



4. Children have noticed that micromobility is underestimated by adults. They made adults aware of the importance of getting to school not only by the more obvious bicycles, but also scooters and rollerblades.

5. From the children's perspective, the journey to school and the way back home are two completely different stories. They juxtaposed the routine and the rush of the morning with the flexibility of the afternoon.

CoMobility

Final conference of the project

TYPESSETTING AND
GRAPHIC DESIGN

Katia Pomorova

