

CitiesA1

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PEOPLE FLOW

PEDESTRIAN TRAFFIC IN WARSAW



citiesAI

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Foreword

I am delighted to present you with the first, but I hope not the last, report devoted to pedestrian traffic in Warsaw.

As we know from recent studies, pedestrian-friendly cities not only have healthier and happier citizens, but are more effective at attracting business and commerce to their streets.

At CitiesAI, we are in the business of identifying hundreds of thousands of images a day from the capital city and its environs. This allows us to analyse pedestrian and vehicle traffic, as well as perform quantitative and qualitative studies of advertising media.

The data we possess reflects the dynamics of change and trends in people's movements much more accurately than other solutions available on the market (e.g. data from mobile devices). The data takes into account changes resulting from,

among others, the dynamically changing urban infrastructure, transport routes, changes in buildings and mass events. This provides knowledge for even better management of the city and taking strategic decisions on its development.

Pedestrian traffic data is also particularly valuable in the context of selecting attractive locations for various retail and restaurant chains. The fact that Nowy Świat is a busy street is nothing new, but finding the busiest places in the Odolany or Mokotów districts constitutes key information for this type of business.

Although this report is dedicated to Warsaw, the technology behind it is universal and can be implemented in any city anywhere in the world.

I hope you find this report interesting and enlightening.



Robert Migas-Mazur,
CitiesAI
DATA SCIENTIST

AN EXPERT EXPLAINS

How do we measure pedestrian traffic in Warsaw?

At CitiesAI, we measure pedestrian traffic using cameras placed on a fleet of vehicles that travel through Warsaw's streets day in and day out. Each photo is uploaded to our servers and, thanks to artificial intelligence algorithms, people, vehicles, billboards and other advertising media are counted on them. Approximately ½ million images are taken every day. We ensure the security of personal data by anonymising the silhouettes of people and the number plates of vehicles.

For geolocation data to be useful, we need to be able to determine exactly where the user is located. Our cameras have a built-in GPS module, so we can determine the location of both the photo and accurately estimate the location of people in the image. This allows us to assign pedestrians to 30-metre long sections of pavement. This also means that even on minor streets we are able to identify how

many people are walking on the left pavement and how many are on the right pavement.

We have compared our data with data from the Municipal Road Authority (Zarząd Dróg Miejskich) reports, as well as with our own stationary pedestrian survey points. To make them as accurate as possible, we assumed certain parameters, for example, the average pedestrian speed and the concealment of pedestrians behind obstacles. This has resulted in over 93% consistency between our vehicle data and reality.

We aggregate data in two dimensions: by time (e.g., hourly distribution, days of the week, seasonality) and spatially (e.g., 30 m pavement section, block, entire neighbourhood). In this publication, our most commonly used measure is the number of pedestrians walking on a given pavement per hour. For ex-

ample, if we give the number of 250 pedestrians per hour per pavement, it means that at a given address, such as Aleje Jerozolimskie 25, 250 people walk past per hour. Often, to compare different locations with different traffic volumes, we normalize the model results by dividing the volume with the average for the location.

To improve the readability of the maps where we show the change in traffic volume on a hexagonal grid, we have removed the hexagons where the change was less than 10% in either direction.

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Warsaw in a nutshell

The restrictions introduced and their relaxation determined pedestrian traffic last year.

The year 2020 in Warsaw, as in many places around the world, was marked by the COVID-19 pandemic. Pedestrian traffic was largely determined by the tightening or relaxation in restrictions. The data from CitiesAI shows how Warsaw residents have adapted to this situation: how much it has affected their daily activities and changed life in the capital.

The restrictions introduced during the first wave of the pandemic depopulated cities for several months and Warsaw was no exception to this.

We heard about the first patient on 4th March 2020 and we also recorded a record number of people on the streets on the very same day. This many pedestrians had not appeared on the streets last year even during the holidays.

According to the Central Statistical Office (GUS), there were 60.8% fewer tourists in Warsaw in the third quarter of 2020 than in 2019¹. In July and August of last year, i.e. when the restrictions were at their most relaxed, there was still 40-50% fewer people in workplaces than before the





pandemic². Traffic at stations and interchanges decreased by about 20-30% during the analysis period, according to Google. These factors, as well as students returning home in the spring, for example, meant that foot traffic throughout the following months did not return to the levels seen in February and early March.

The lowest activity was recorded during the first lockdown, when the drop in the number of people on Warsaw's streets was about 50%. The situation was different in office districts compared to residential districts, which we will discuss in greater detail in the following chapter. We also experienced empty streets between Christmas and the New Year. Despite the bans on movement, a few days of good weather in March encouraged people to emerge from their homes. From 27th-29th March we saw an increase in pedestrian numbers of about 25% over the new base following the introduction of lockdown on 12th March. It was as a consequence of this relaxation that it was later decided to close woods and parks.

Traffic on Warsaw's streets began to return in May as the government loosened restrictions, reaching levels close to the pre-lockdown average in the first half of June. It was not until the August holidays that the activity of Warsaw

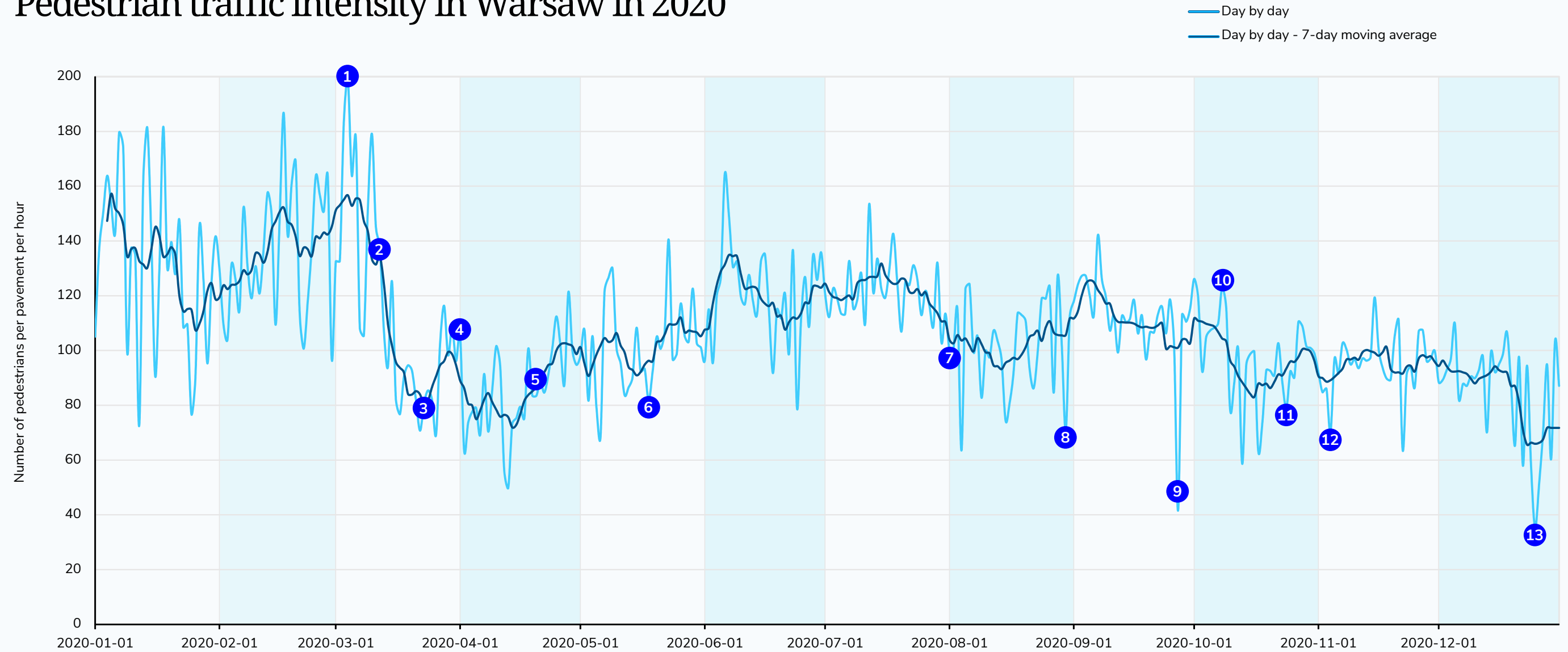
residents decreased. It is also worth bearing in mind that pedestrian traffic is affected by the weather. On days with very heavy rainfall, there are far fewer people on the streets. Such a day was 27th September, for example, when there were twice as many pedestrians as the late August average would suggest.

The autumn, which coincided with the second, much more severe wave of the COVID-19 pandemic, was characterised by a slow decline in the activity of Warsaw residents. While in the spring we saw a sharp decline in traffic, in the autumn the biggest drop occurred just after Warsaw was included in the yellow zone (one of the restrictions introduced at that time was the order to wear face masks in public). After that, traffic remained at a higher level than in the spring, but no movement ban was imposed at that time either.

¹ <https://warszawa.stat.gov.pl/opracowania-biezace/informacje-okolicznosciowe/inne-turystyka-w-iii-kwartale-2020-r-,12,37.html>

² <https://www.google.com/covid19/mobility/>

Pedestrian traffic intensity in Warsaw in 2020



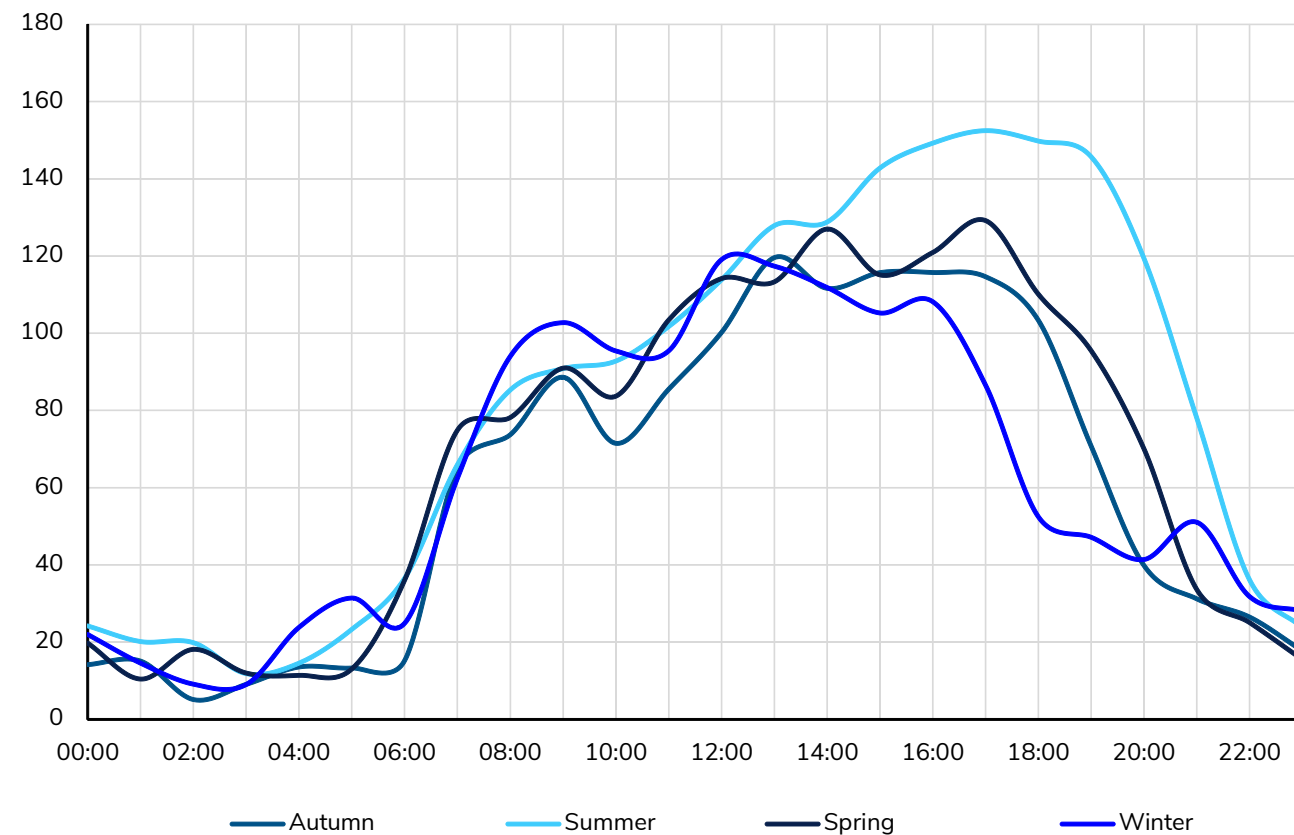
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|--|---|---|
| 1 04/03 – Highest number of pedestrians in 2020 | 6 18/05 – Opening of gastronomy outlets and hairdressers, among others | 11 24/10 – Secondary schools closed and years IV-VIII in schools |
| 2 12/03 – Beginning of lockdown | 7 01/08 – Tourist vouchers start to operate | 12 04/11 – Closure of years I-III in schools |
| 3 24/03 – Movement ban | 8 30/08 – Storm in Warsaw | 13 25/12 – Christmas – the lowest number of pedestrians in 2020 |
| 4 01/04 – Woods and forests closed | 9 27/09 – Sunday and a change in the weather | |
| 5 20/04 – Stage I in the easing of restrictions | 10 08/10 – Warsaw included in the yellow zone | |

Traffic intensity and seasons

The seasons of the year and the associated length of the daylight have an impact on the behaviour of Warsaw's residents. The longer days in summer shifts the peak of afternoon activity from 12:00-13:00, as it is in winter, to the hours of 16:00-18:00. However, in winter Varsovians are more likely to function in the morning hours.

Interestingly, the afternoons are more popular in the spring than in the autumn, despite similar lengths of day. Since both of these seasons were hugely affected by the pandemic, conclusions should be drawn with caution.

Average pedestrian intensity in Warsaw over the four seasons – number of pedestrians/hour

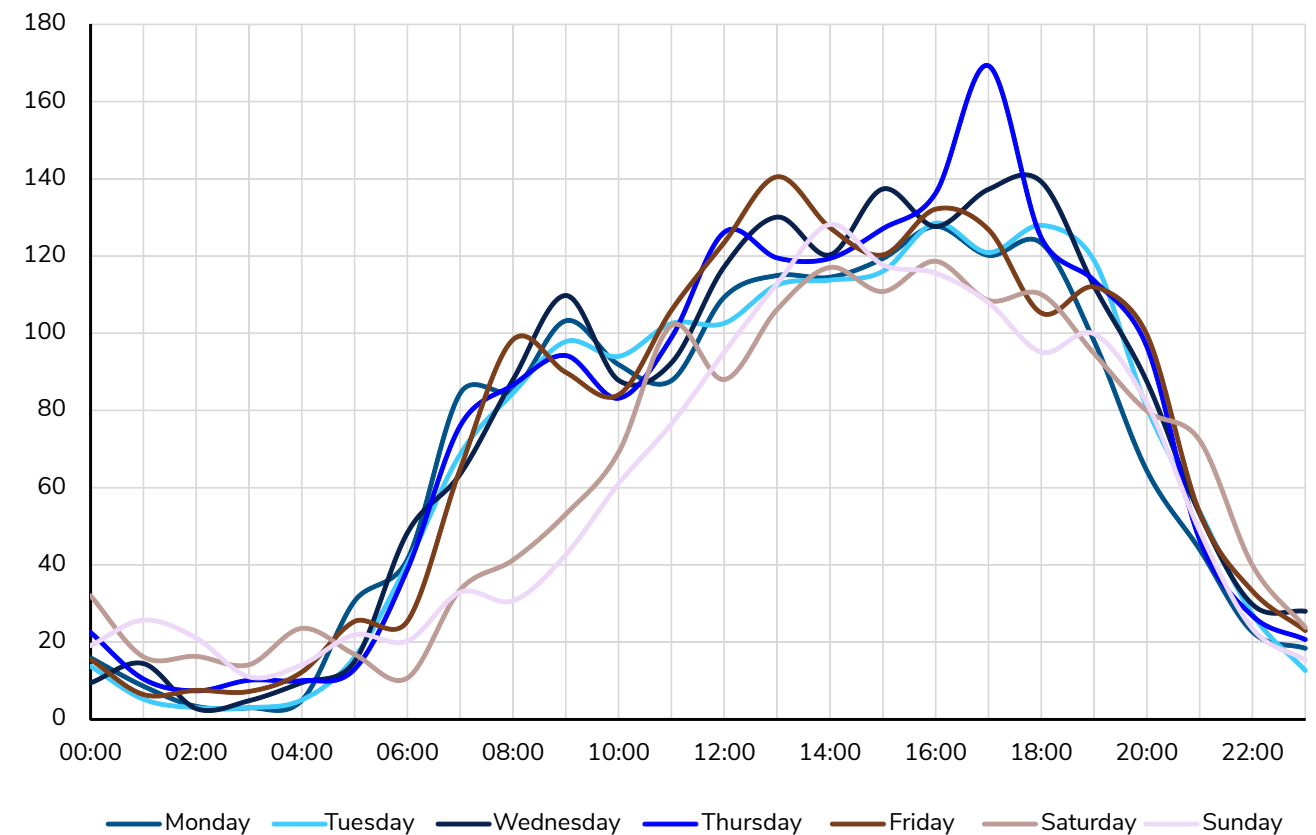


Traffic intensity and days of the week

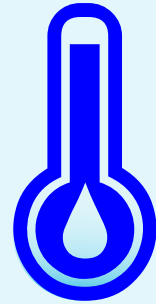
We also analysed what the hourly distribution of pedestrian intensity looks like by day of the week. The first conclusion that comes to mind is that on weekends Varsovians like to sleep longer, or at least stay at home longer. The day with the lowest activity during the week is Sunday. On weekdays, the morning peak falls between 08:00

and 10:00, while the afternoon peak is mobile. On Fridays it falls at 16:00, while on Thursdays it is after 17:00, which would suggest that Varsovians like to properly finish their working week before starting the weekend. Friday and Saturday are days with increased activity after 22:00. In the evening, the lowest traffic is on Mondays.

Average pedestrian intensity in Warsaw on different days of the week – number of pedestrians/hour



How does the weather affect pedestrian traffic?



An increase in temperature of 2.5°C compared to the previous day
5% more people on the streets



A drop in temperature of 2.5-5°C compared to the previous day
2% decrease in pedestrian traffic



A drop in temperature of 5°C compared to the previous day
7% decrease in pedestrian traffic



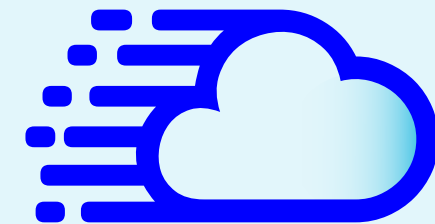
0.5-1 mm of rain per hour
9.06% decrease in traffic compared to the previous day



1 mm of rain per hour
35% decrease in traffic compared to the previous day

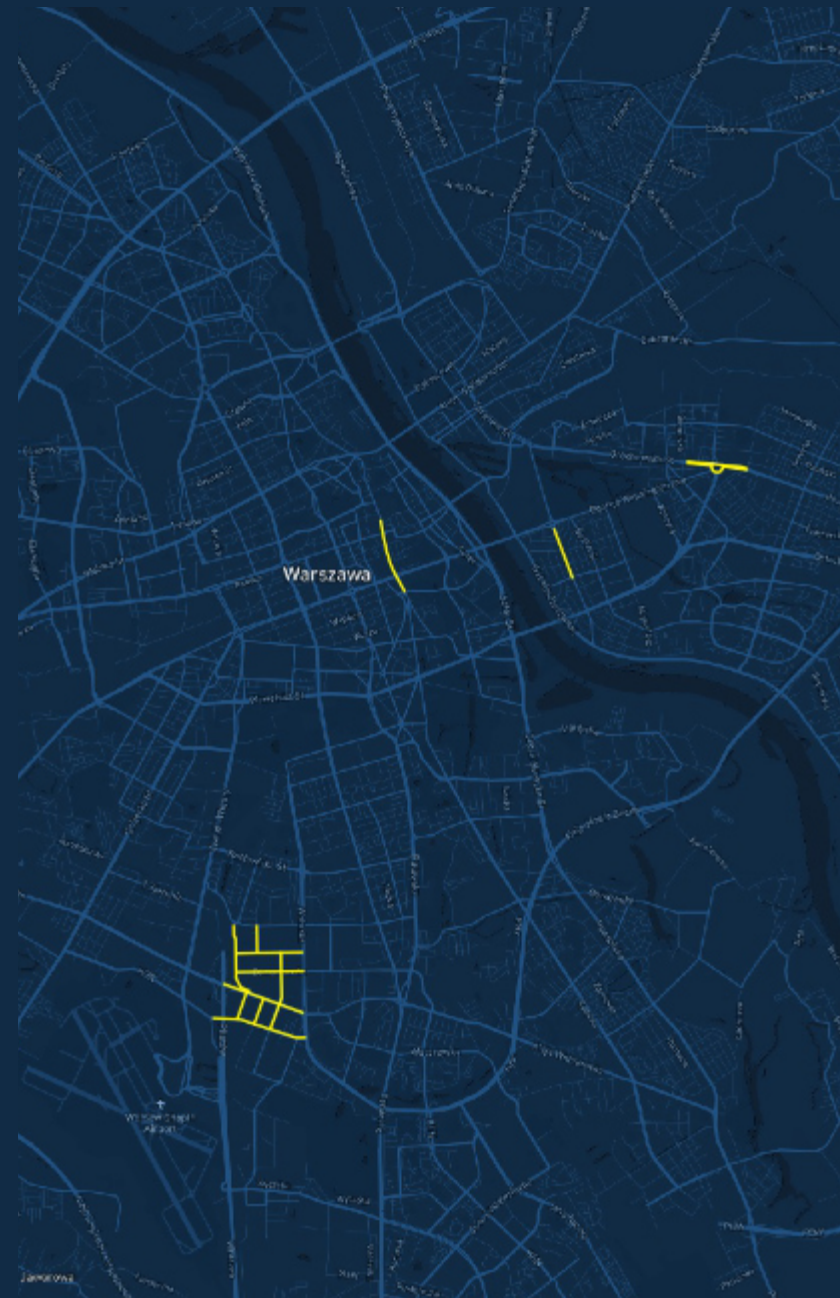


On overcast weekends
14.2% fewer people than on sunny weekends

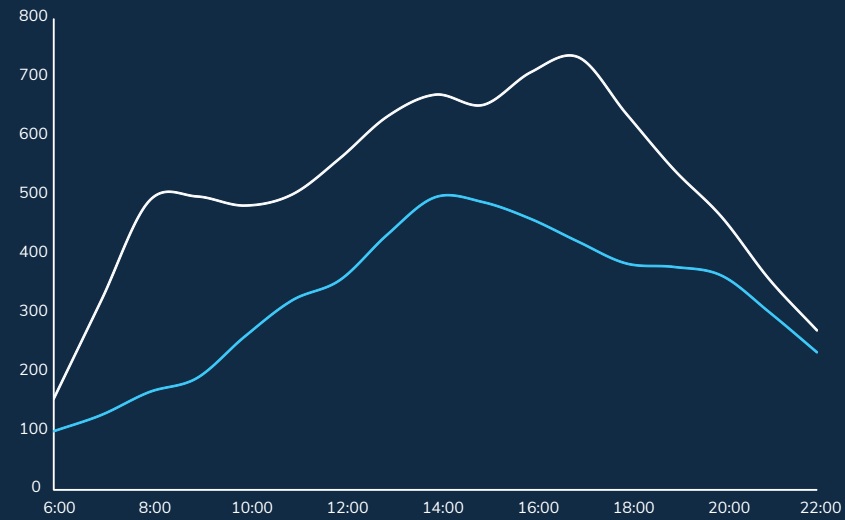


On windless days
(wind speed less than 1 m/s)
9% more people than average

Warsaw in four charts

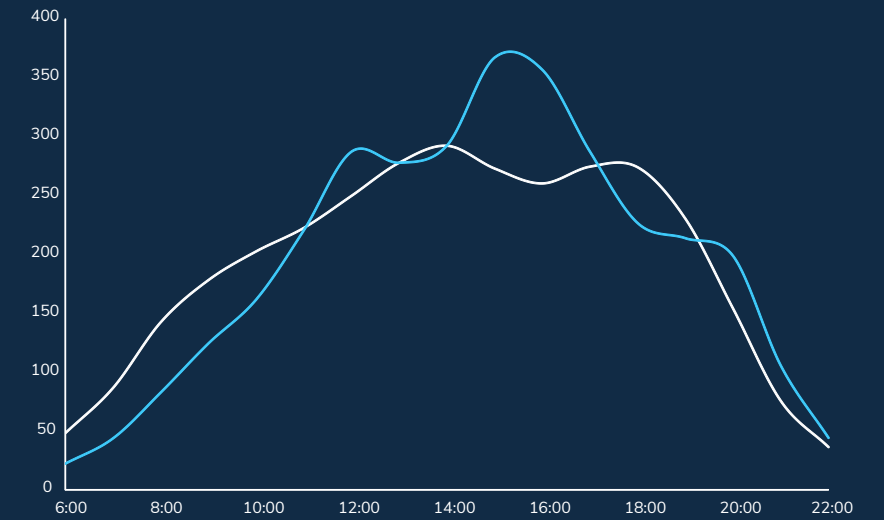


Nowy Świat street – number of pedestrians/hour
Strong afternoon peak, a street associated with tourism

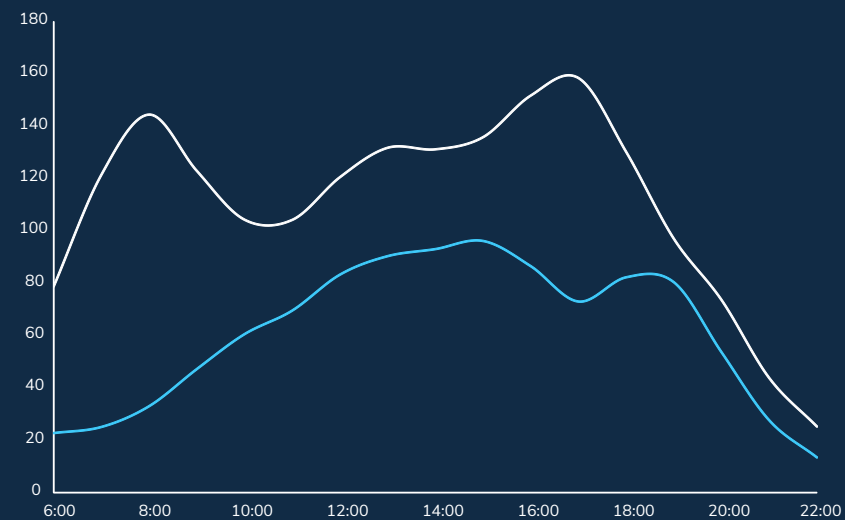


— Weekdays — Weekends

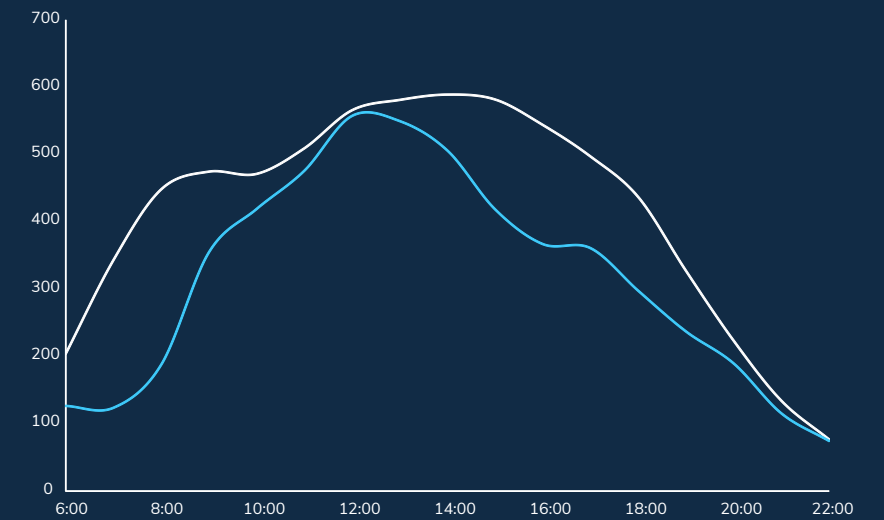
Francuska street – number of pedestrians/hour
A street with many restaurants, weekend traffic exceeds weekday traffic



Służewiec – number of pedestrians/hour
An office district, obvious morning and afternoon peaks



Rondo Wiatraczna roundabout – number of pedestrians/hour
An important transport hub, heavy traffic on weekdays and weekends





Dawid Przemyski, CitiesAI
BUSINESS DEVELOPER

AN EXPERT EXPLAINS

Why measure pedestrian traffic?

By adopting a methodology based on real-world measurement and technology using a proprietary machine learning architecture and a field image database for AI (artificial intelligence) algorithms, CitiesAI is able to provide the most accurate pedestrian traffic data. The list of applications for this data is extensive.

Wherever pedestrian traffic is the most important or one of the key factors considered in relation to site selection, our data provides tangible value. In particular, I am referring to high street shops, supermarkets (proximity stores), services and restaurants/fastfood outlets. Where should I open another store? How should I choose my opening hours? Why do sales results differ between outlets located on the same street? These are just some of the questions that our data answers. The data is used to develop a retail network, optimise existing outlets or decide on expansion.

CitiesAI analytics are also used by consulting, research, and investment firms and property managers. In the case of these companies, the measurement of pedestrian traffic may complement extensive multi-criteria analyses determining the level of attractiveness of a given location already held by them.

The recipients of pedestrian traffic data are not just businesses. The leaders of many cities around the world are aware of its relevance to urban development. For example, Melbourne uses an automated pedestrian counting system to develop pedestrian flow models, assess city infrastructure and public transport, monitor commercial activity and assist businesses in developing marketing strategies, and for emergency planning and response. In Poland, this kind of approach is only just being developed – so far there haven't been effective measurement methods.

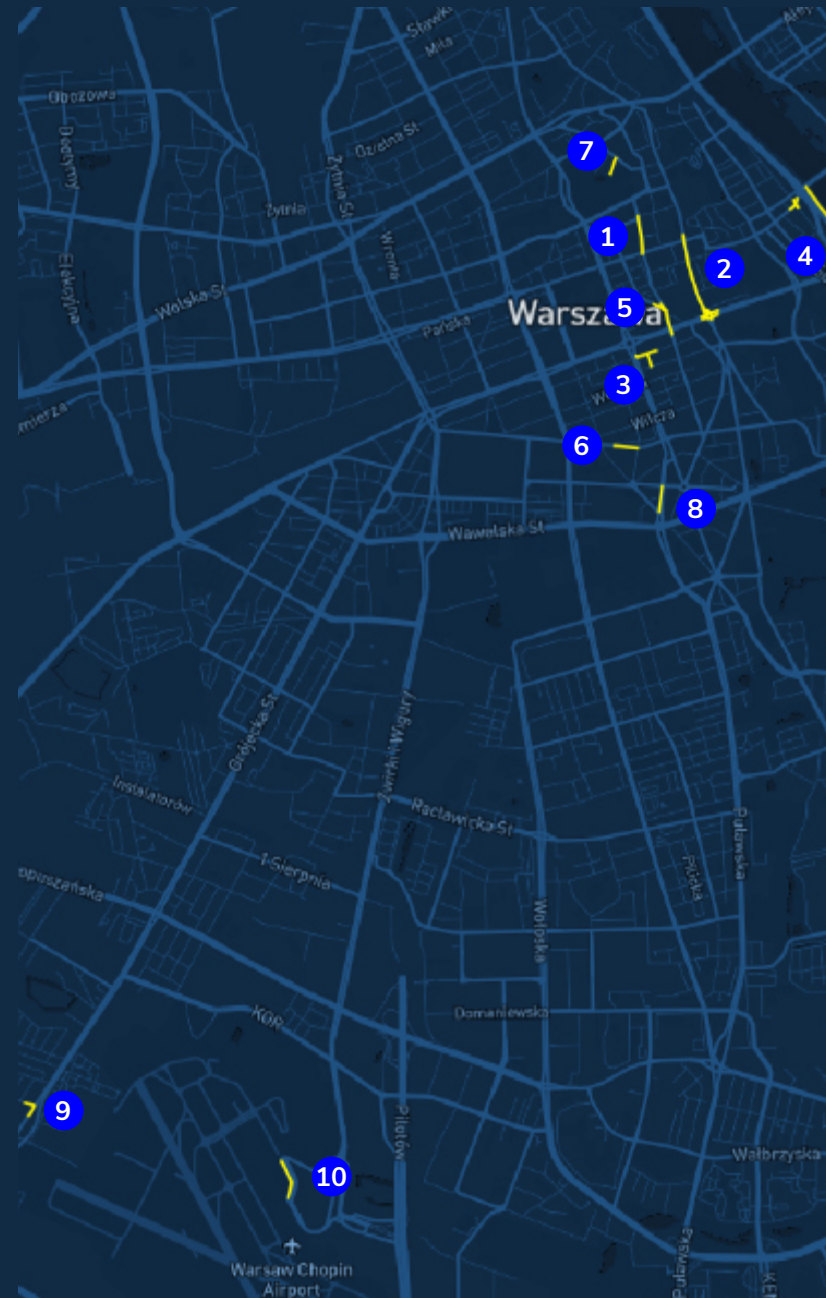
Personally, I am convinced that the potential of using new technologies and making decisions based on precise data about the surrounding reality will only grow, whether in relation to business development, random events (such as the COVID-19 pandemic), or in the context of planning and managing a dynamically changing urban space.

The busiest places in Warsaw



7⁰⁰-19⁰⁰

Despite the COVID-19 pandemic, the most popular places were those in the centre of Warsaw: Trakt Królewski **1**, Plac 5 Rogów with Chmielna street **2**, Emilii Plater street **3**, Marszałkowska street **4** on the section from Rondo Dmowskiego to the Świętokrzyska metro station, the former "Femina" Cinema **5**. The following interchanges are also busy: Rondo Daszyńskiego **6**, Rondo Wiatraczna **7**, Plac Zawiszy **8**, Plac Wilsona **9**, the intersection of Wałbrzyska street and Puławska street **10**, Plac Wileński **11** or the Politechnika metro station **12**. Outside the city centre, the areas around the city markets in Praga-Południe (Plac Szembeka **13** and Męcińska street **14**) were very popular.



22⁰⁰-5⁰⁰

At night, club and restaurant venues reign supreme: Mazowiecka street **1**, Nowy Świat street **2**, Parkingowa street **3**, the Vistula Boulevards **4**, Plac Pięciu Rogów **5**. Many people are also attracted by Hala Koszyki **6** and Fredry street **7**, where Teatro Cubano is located. On our list there is also a bus stop at Waryńskiego street **8**, from where night buses to the south of Warsaw depart. Interestingly, there is a point on the list at Aleja Krakowska **9**, where heavy traffic occurs before 05:00, and Warsaw's Chopin Airport **10**.

The pandemic and its impact

How did pedestrian traffic change in Warsaw during the first and second lockdown?

Warsaw was strongly affected by both waves of the corona virus pandemic. It was not just the restrictions, including the closure of shopping centres and limits to the number of people in shops and on public transport, but also the fear for one's own life that caused certain places in the capital to become deserted. Only the vicinity of parks (Dolinka Służewiecka, Kampinos National Park and the Kabacki Forest) and the River Vistula recorded an increase in the number of people.

According to our data, the hardest hit area was the city centre, especially in the vicinity of Nowy Świat, Krakowskie Przedmieście, the Central Railway Station and the Politechnika metro station, i.e. places frequented by tourists and students. Pedestrian traffic also decreased in office districts: around Rondo Daszyńskiego and in the Służewiec district.

We also analysed how the restrictions affected Warsaw's public transport system, churches, shopping centres and educational facilities.



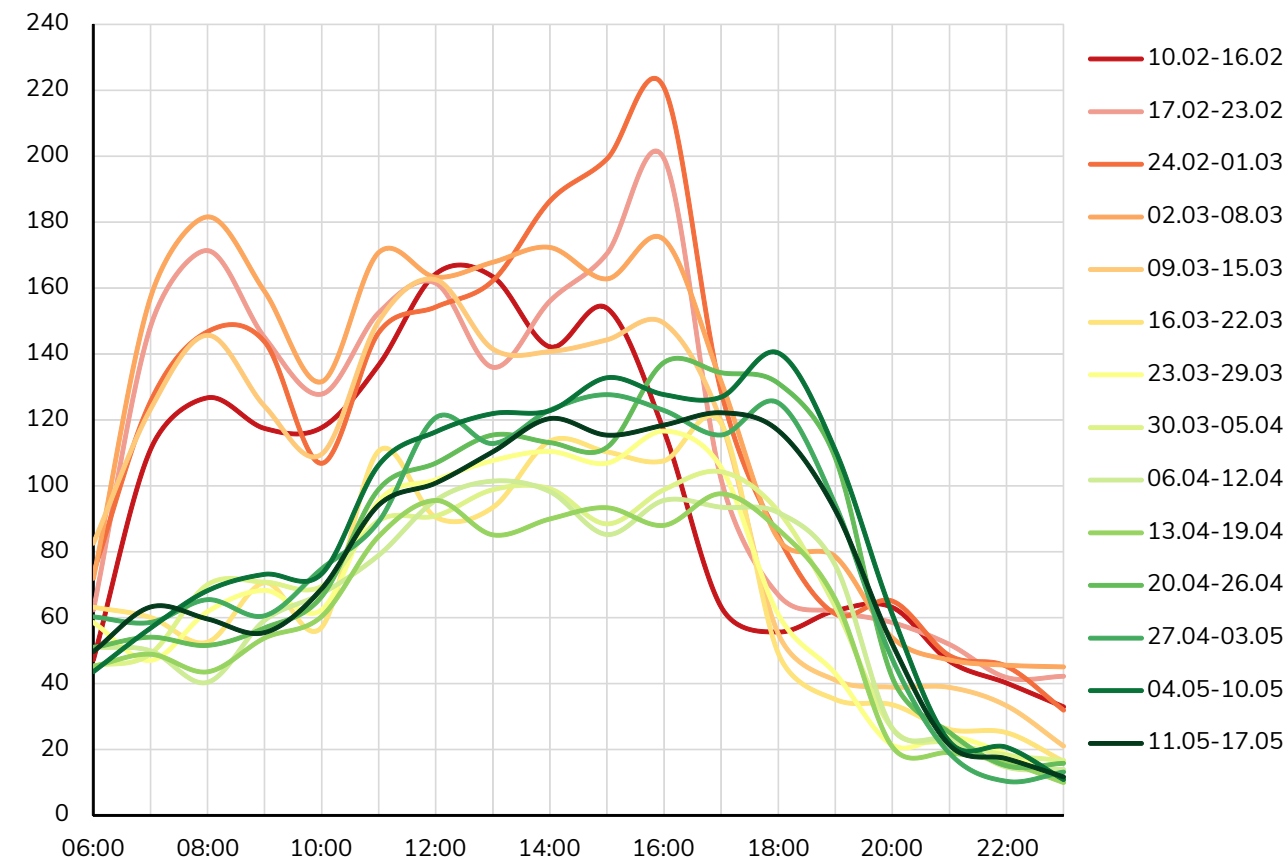
Pedestrian traffic during the spring lockdown

In the first weeks of the restrictions, the biggest drops in traffic were observed in the Służewiec district, at Rondo Daszyńskiego and in the city centre. Residential districts – Praga-Północ, Bemowo and Ursynów - recorded about 20% fewer pedestrians. Traffic returned to normal the fastest in Bemowo (as early as mid-April) and in Wawer. In June, most of the districts analysed

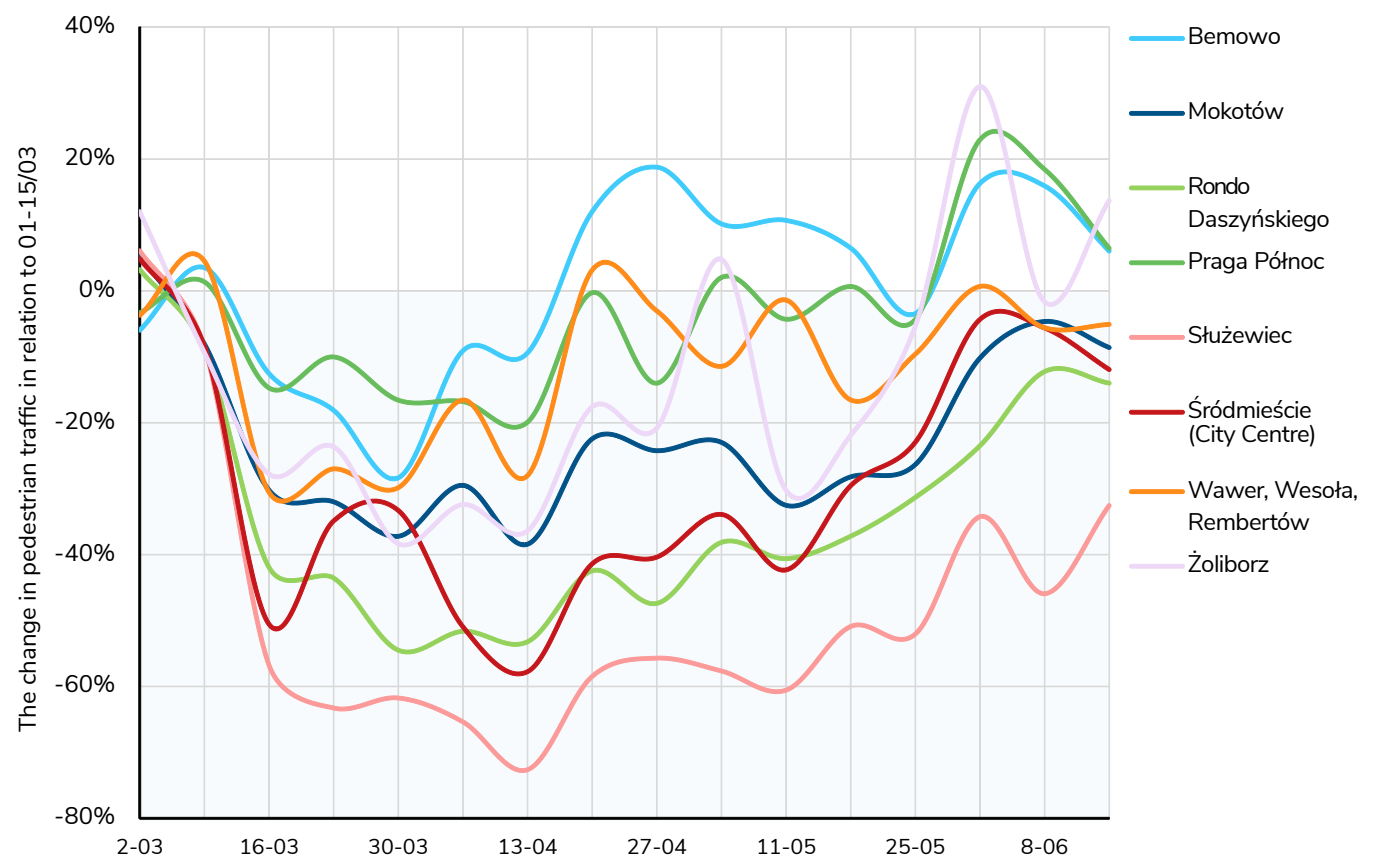
returned to their pre-pandemic levels - the city centre was close to it (in June it had a drop of approximately 10%), and the worst situation was in the Służewiec district, where employees did not return to their offices. Even in June there were about 30-40% fewer people there compared to the pre-pandemic levels.

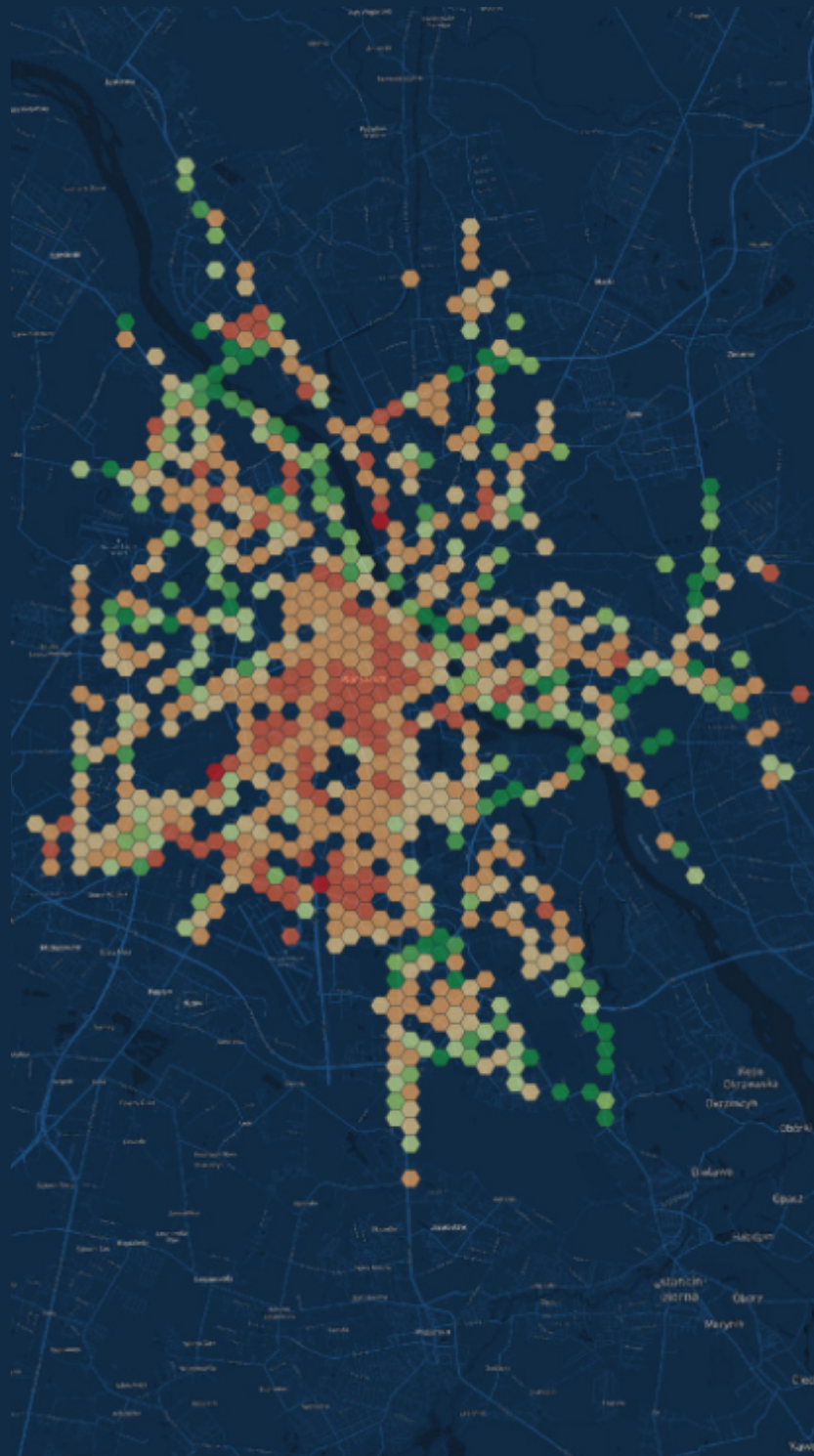
The pandemic also significantly affected the pedestrian habits of Varsovians during the day. Last February, more people could be found on the streets at 08:00 than at 10:00, and from March onwards the streets were deserted until about 12:00. Nightlife also suffered, with traffic after 21:00 being 50% lower than in February.

Hourly distribution of pedestrian traffic in successive weeks of the spring pandemic wave



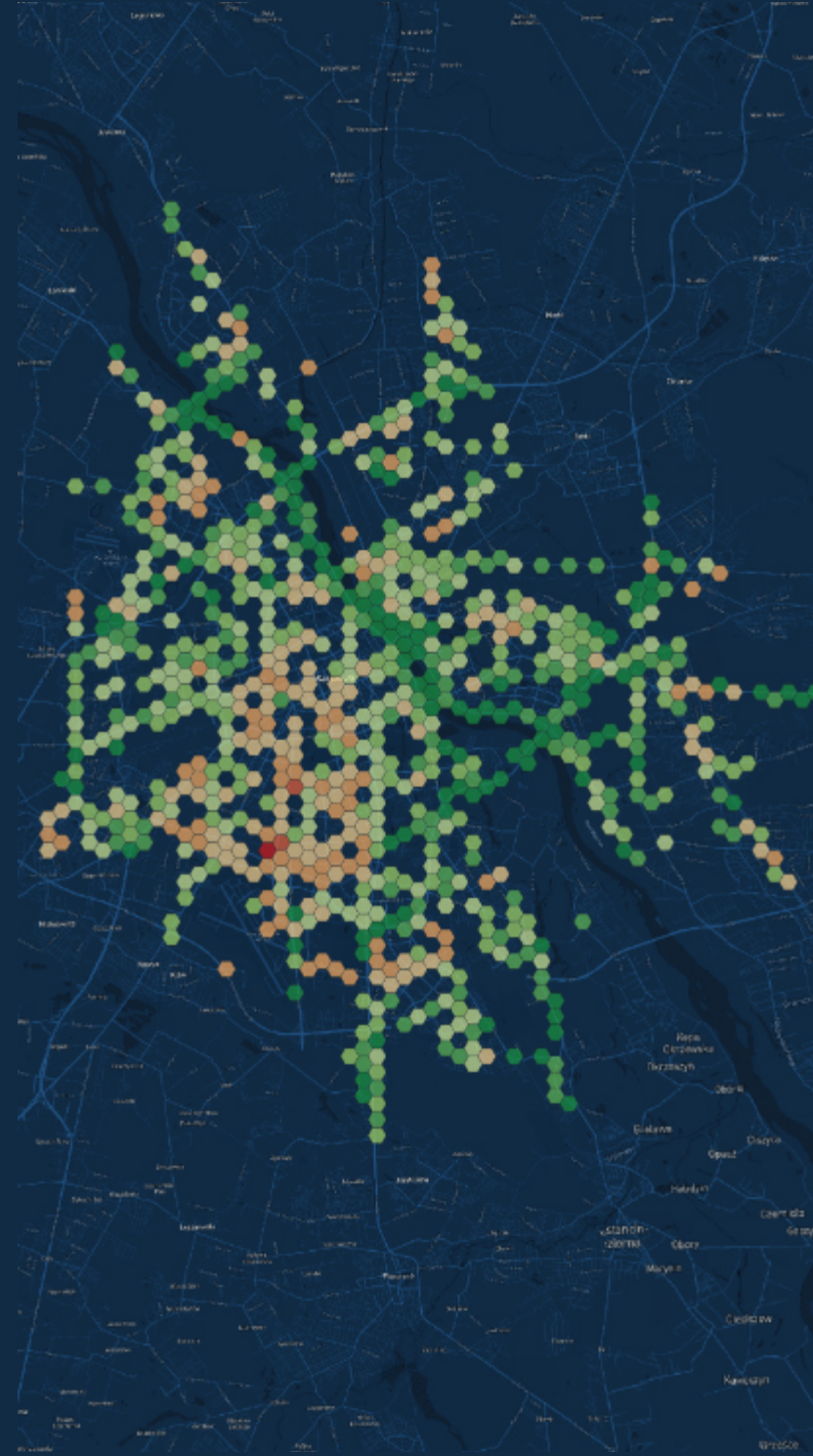
Pedestrian traffic in Warsaw districts during the spring wave of the pandemic





Change in pedestrian traffic during lockdown compared to the pre-pandemic period

- increase of over 100%
- increase of 50-100%
- increase of 25-50%
- increase of 10-25%
- decrease of 10-25%
- decrease of 25-50%
- decrease of 50-75%
- decrease of over 75%



Change in pedestrian traffic during the summer compared to the spring lockdown

Less activity was recorded in the area of Rondo Daszyńskiego, the Politechnika metro station, Aleje Niepodległości, and the Służewiec and Stare Bielany districts. An increase was recorded in the residential districts of Bemowo, Praga-Południe, Targówek, as well as the areas next to the River Vistula. Generally, as we stated in Chapter 1, Warsaw's residents are more likely to take to the streets in summer and, were it not for the pandemic, we would expect an even increase across all Warsaw.

For greater legibility of the map, hexagons where traffic did not change by more than 10% have been removed.

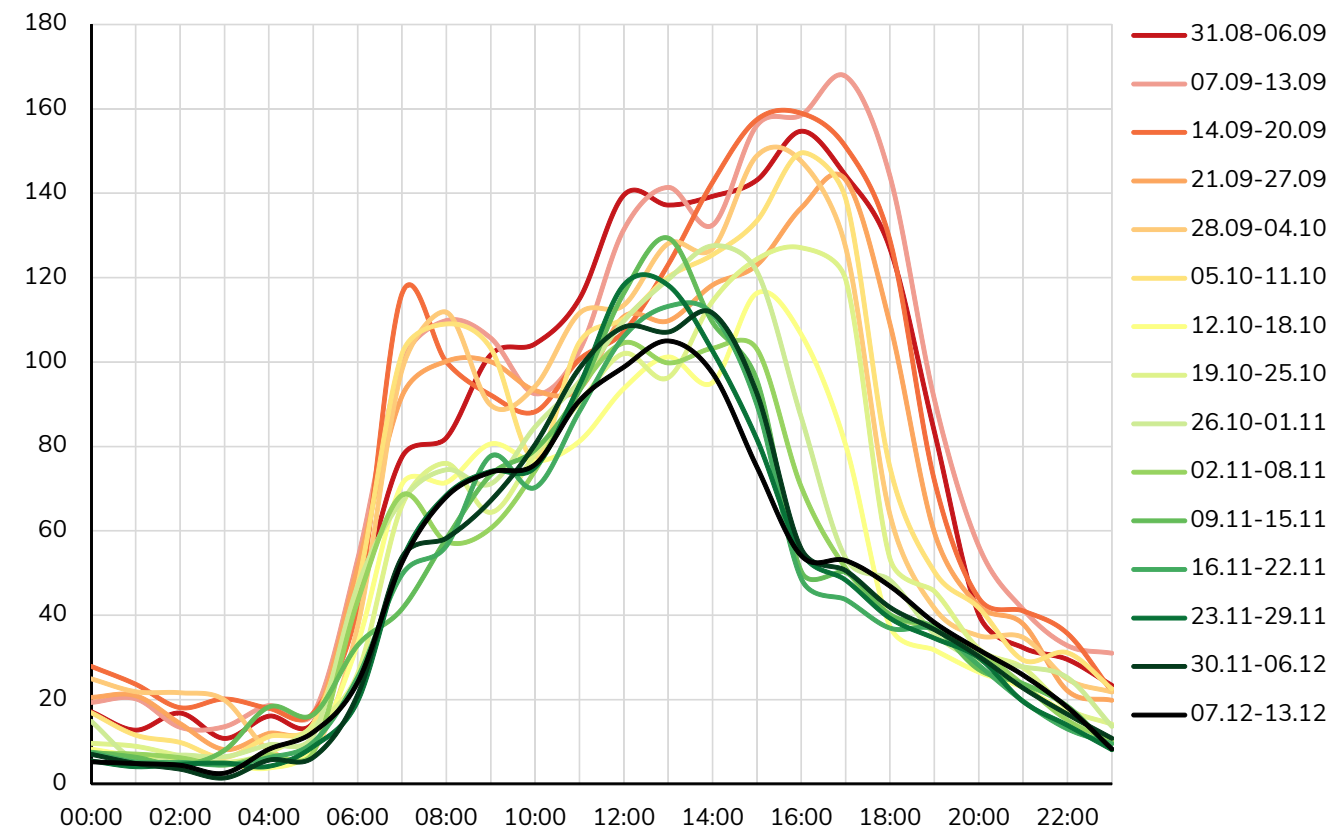
Pedestrian traffic during the autumn lockdown

In the autumn, the reduction in traffic was slightly less than in the spring. This is due firstly to the smaller base, i.e. there were fewer people on the streets in the summer than in the spring, as well as there being no formal ban on movement. There were no closed forests or parks either. This time it was not the Służewiec district that suffered the most, as the traffic there did not return during the

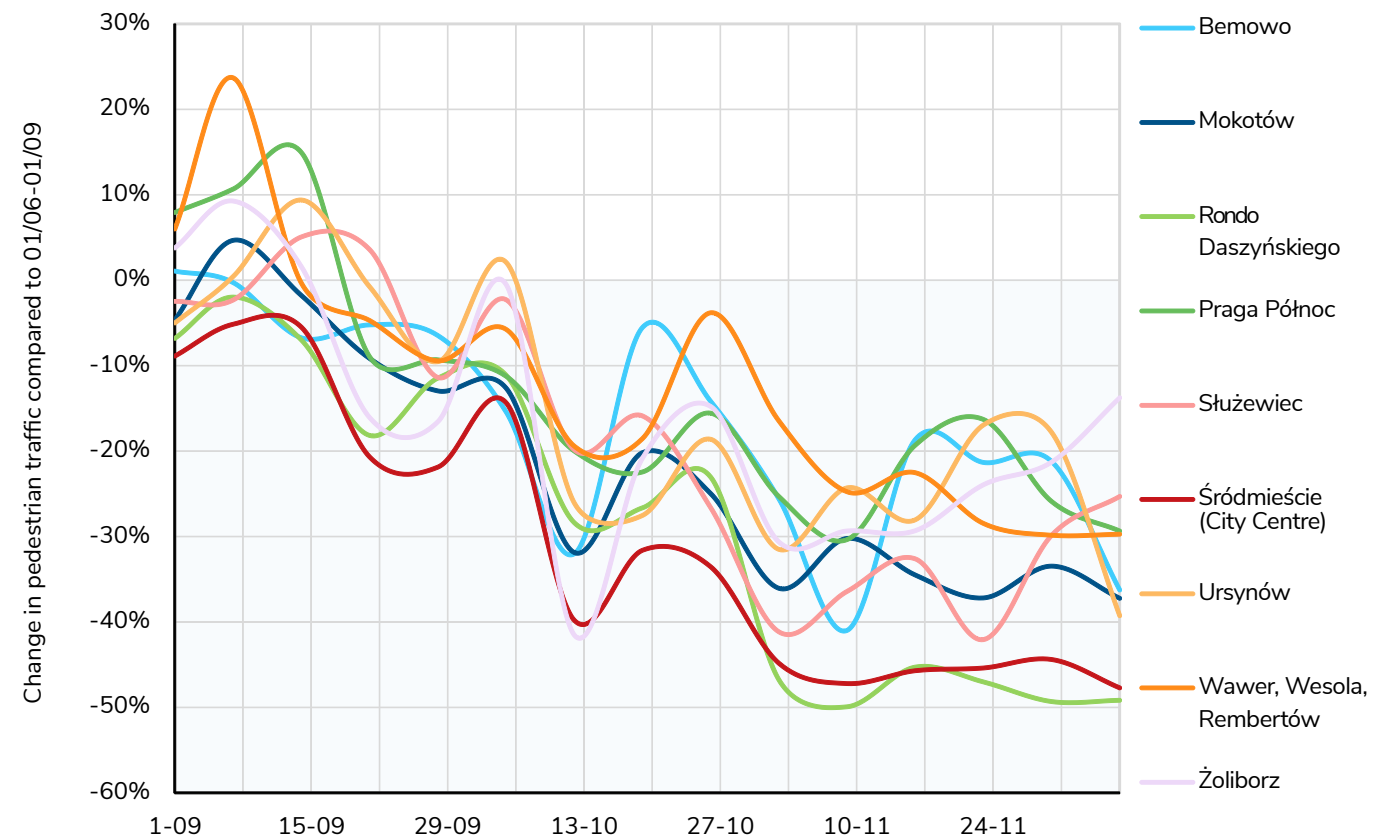
summer anyway, but the area around Rondo Daszyńskiego and the City Centre. The biggest decreases occurred in the first half of October, when Warsaw was in the yellow zone and the number of sick people exceeded 1,000 per day.

On the hourly chart, we can see a similar effect to that noted in the spring – from a two-peak hourly distribution, i.e. a morning peak at 08:00 and an afternoon peak at 16:00-17:00, it became a single-peak at 12:00-13:00.

Hourly distribution of pedestrian traffic in successive weeks of the autumn pandemic wave

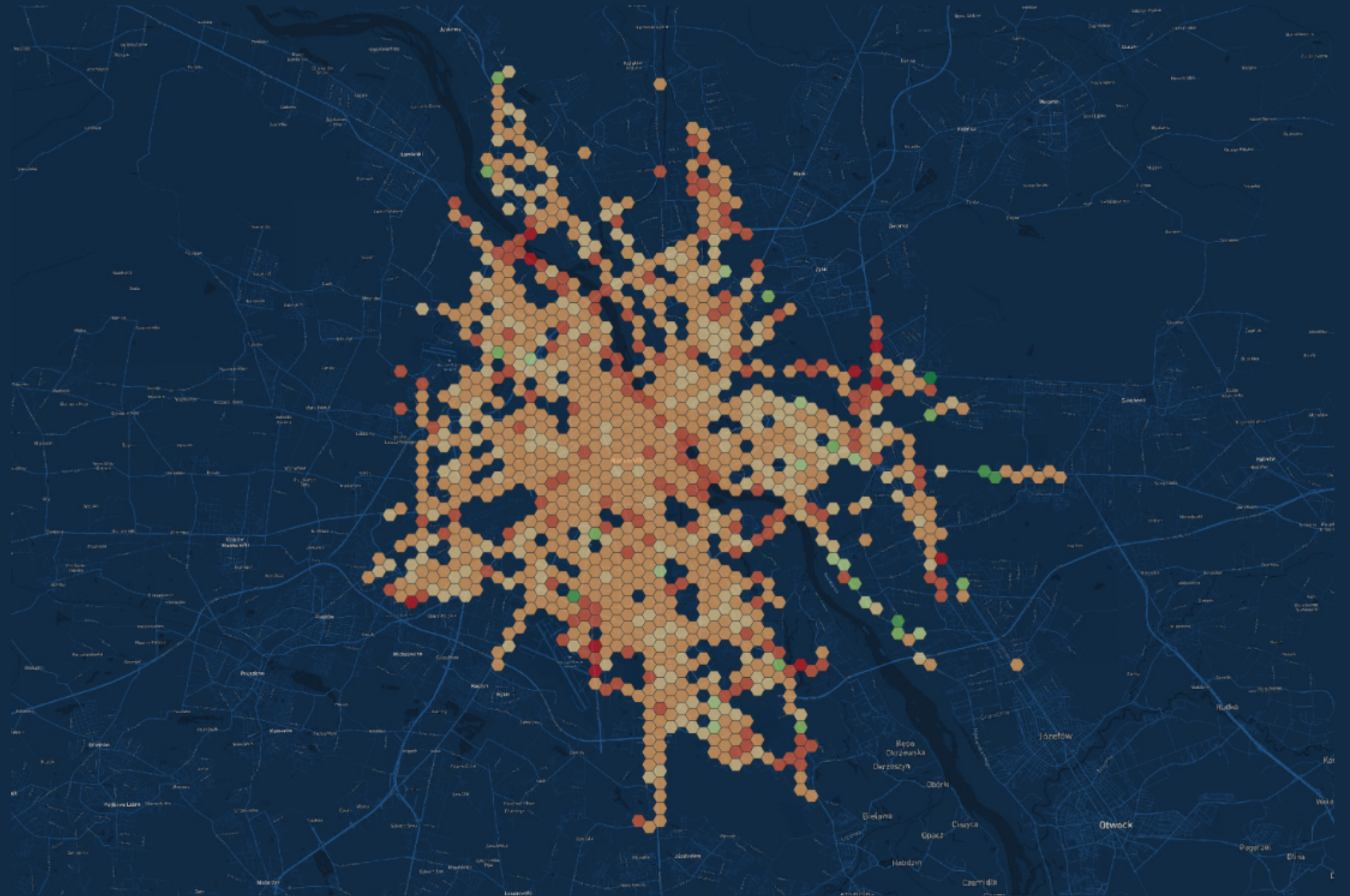
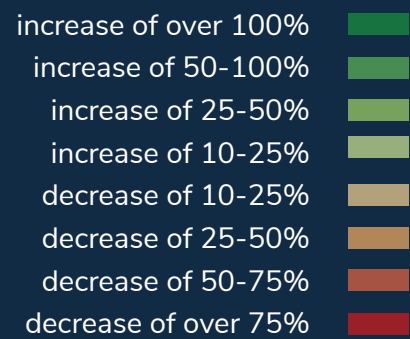


Pedestrian traffic in Warsaw districts during the autumn pandemic wave



Change in pedestrian traffic during the autumn pandemic wave compared to the summer

As a result of the high base, the traffic along the River Vistula decreased the most, but we can presume that it has more to do with the cooler autumn days and shorter daylight hours than with the pandemic. Relatively low decreases were recorded in residential districts – Bemowo, Targówek, Praga-Północ and Praga-Południe.



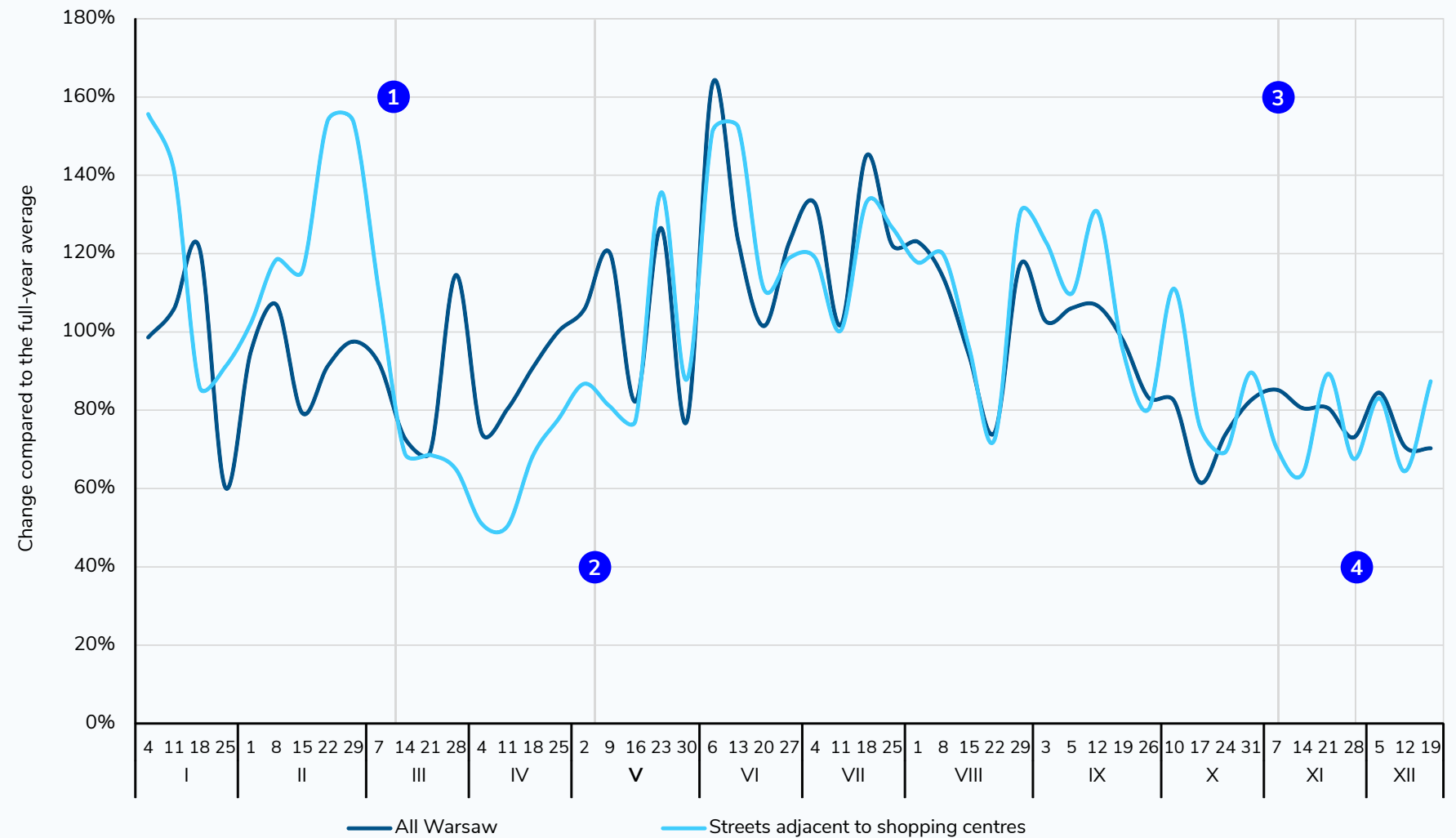
Shopping centres

The closure of shopping centres has resulted in people being less interested in the areas around shopping centres, as shown by an analysis of pedestrian traffic around the 29 largest shopping centres in Warsaw. We chose Saturdays as the days with the lowest proportion of people moving to and from work. Sundays, on the other hand, are disrupted by non-trading days.

According to our data, traffic began a slow recovery after the shopping centres re-opened in May, reaching its highest peak over traffic in the rest of the city in September and October, just before the imposition of more restrictions.

When the shopping centres closed again on 7th November, shoppers did not return to the surrounding areas in December. Pedestrian traffic has not recovered as it did after the first lockdown.

Pedestrian traffic intensity at shopping centres on consecutive Saturdays in 2020



1 12/03 – Lockdown begins

2 04/05 – Re-opening of shopping centres

3 07/11 – Closure of shopping centres

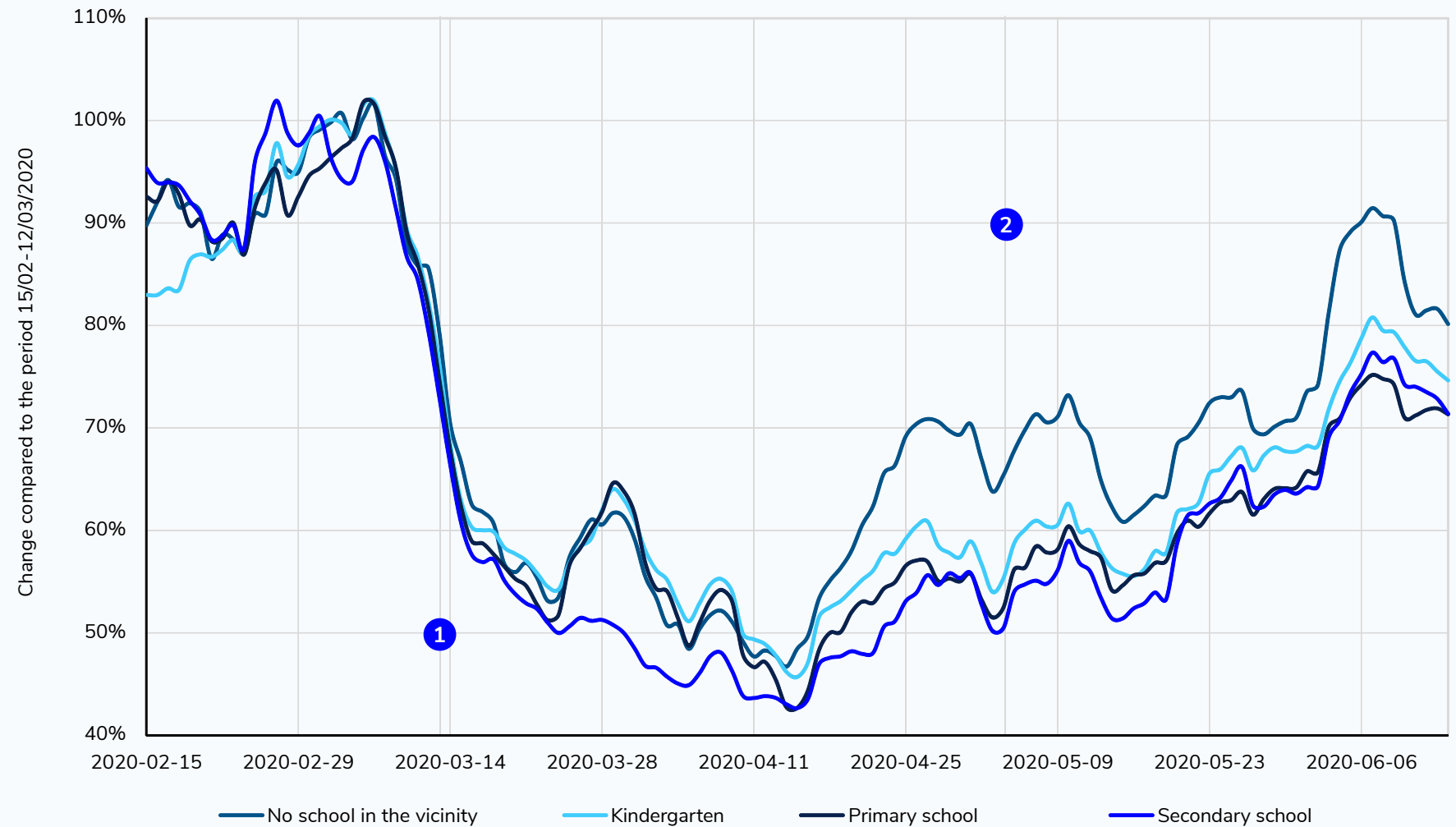
4 28/11 – Re-opening of shopping centres

Schools

We analysed the areas around 637 educational facilities in Warsaw during the epidemic: 343 kindergartens, 216 primary schools and 78 secondary schools. We only considered the hours between 06:00 and 16:00, the hours during which schools could generate the most pedestrian traffic. Before lockdown, the highest volume of pedestrian traffic was around secondary schools. One of the factors having a significant impact may be that young people are driven to the secondary schools or technical secondary schools included in the analysis much less frequently by their parents than is the case with younger children.

On 12th March, schools suspended lessons and the biggest drop in pedestrian traffic was at secondary schools. As of mid-April, pedestrian traffic at all educational institutions remains 10-20 p.p. lower than the rest of the city.

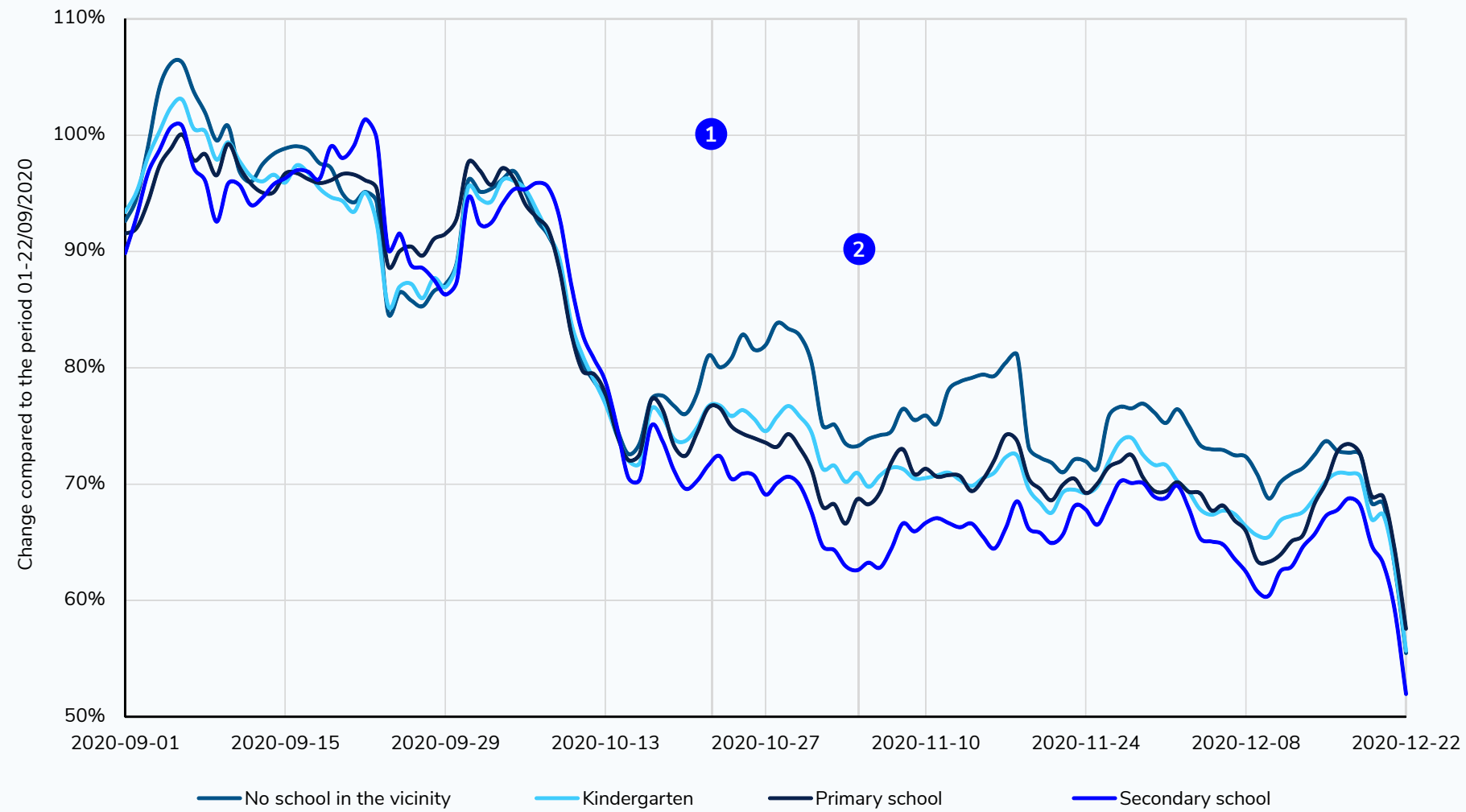
Pedestrian traffic within 200 m of schools during the spring wave of the COVID-19 pandemic



1 12/03 – lockdown

2 04/05 – opening of nurseries and kindergartens

Pedestrian traffic within 200 m of schools during the autumn wave of the COVID-19 pandemic



1 24/10 – closure of secondary schools and years IV-VIII

2 04/11 – Closure of years I-III in schools

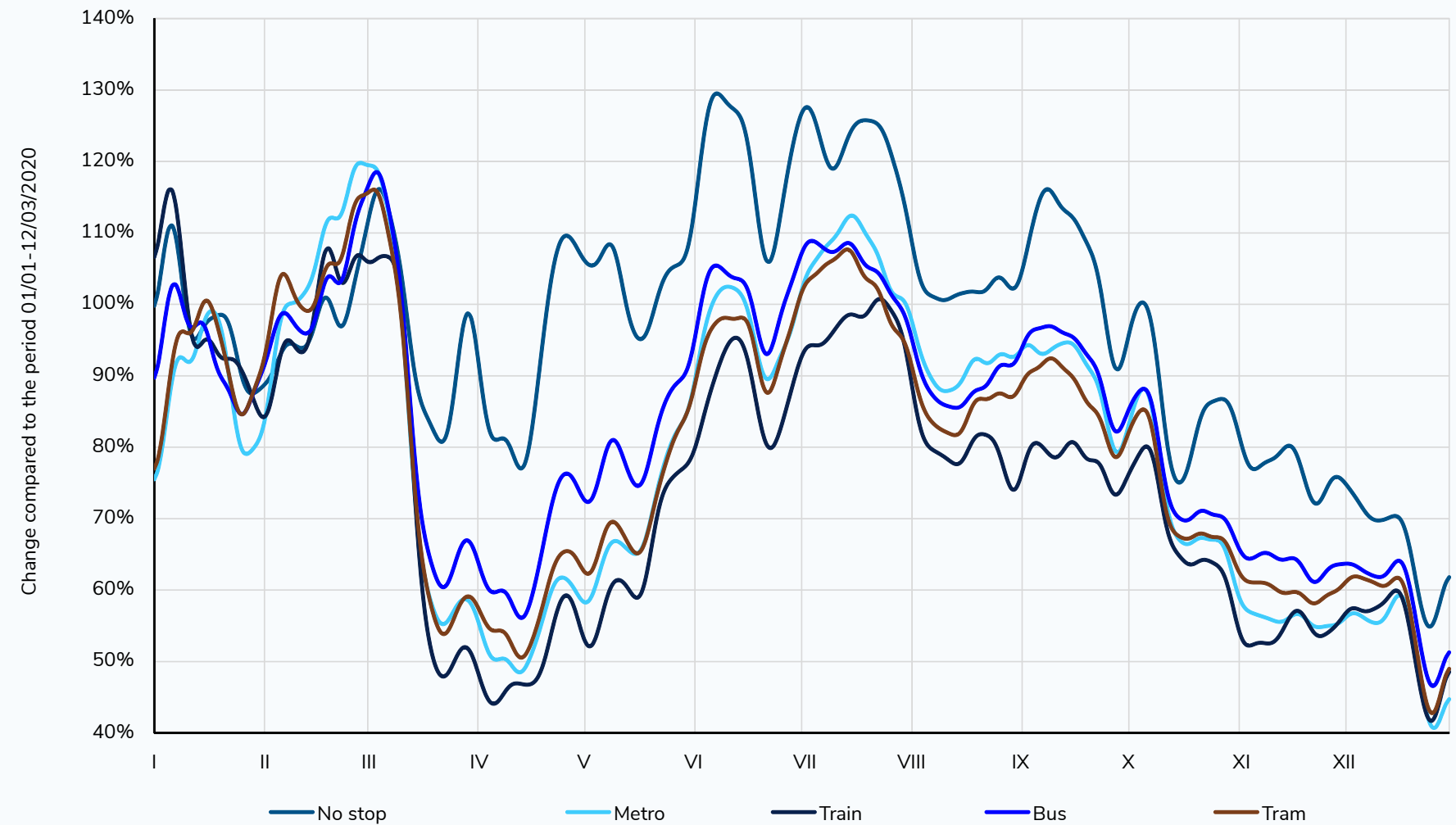
A similar effect was noted in the autumn, although then the differences were already lower and oscillated around 10 p.p. This may be related to the worsening weather and generally lower activity of Varsovians at that time.

Public transport

The COVID-19 pandemic has changed the transportation habits of Varsovians. The impact of the restrictions and the fear of Varsovians becoming infected in crowded areas were evident in the analysis we conducted around bus, tram, metro and suburban train stops. The drop in traffic during the spring lockdown reached 50% and affected the area around stations the most, with bus stops affected to a slightly lesser extent.

Our data shows that in the summer Varsovians started to use the metro the fastest and it was in its vicinity that we recorded the greatest number of people. As the autumn outbreak progressed, all modes of transportation saw traffic at spring lockdown levels.

Pedestrian traffic intensity in the vicinity of public transport stops during the COVID-19 pandemic



How has the pandemic affected the movements and behaviour of consumers?

The current epidemiological situation and related isolation have undoubtedly influenced the movements of Varsovians and the inhabitants of other cities in Poland. What specific phenomena have changed our behaviour and what might the new reality look like? Interesting conclusions are revealed by juxtaposing CitiesAI data with research on Polish society conducted by PwC experts¹.

The vast majority of us care more about our mental and physical health these days. Therefore, remote working and learning, which gives a sense of security, has gained huge popularity with many of Warsaw's employers and educational facilities, as well as employees and students. This has certainly had a significant impact on the decrease in pedestrian traffic, e.g. in the city centre, near the Politechnika metro station or in the vicinity of Domaniewska street.

There is also a noticeable decline in public transport and co-sharing traffic, mainly in the 45+ age group. Statistics show that 26% of Poles are more likely to choose their own car now than before the outbreak. It is also interesting to note the increasing popularity of cycling or walking, a trend that undoubtedly has a positive impact on the health of residents and the environment.

The change in behaviour of Poles in the urban space is dictated not only by the successive government ordinances regarding travel restrictions, but also by the closure of catering facilities and shopping centres. Online shopping is increasingly popular, as admitted by 1/3 of us. However, this does not apply to groceries, which, despite the pandemic, we still choose to buy in person from stationary stores in close proximity to our homes. Undoubtedly, there is a greater need to shop in

a traditional store around housing estates inhabited mainly by elderly people who do not use online stores on a daily basis or are afraid to travel greater distances so as not to endanger their health.

The events that 2020 has brought us will permanently change the rules of the global economy and the shopping habits of consumers. That is why it is so important to constantly monitor the reality around us and to collect and analyse dynamic and up-to-date data. Only in this way will it be possible for companies to quickly and effectively adapt to the new reality and respond to the needs of customers.



Michał Kliś, PwC
GEOANALYTICS, SENIOR MANAGER,
GEOSPATIAL HUB LEAD

¹ <https://www.pwc.pl/pl/pdf-nf/2020/raport-pwc-nowy-obraz-polskiego-konsumenta.pdf>;
<https://www.pwc.pl/pl/pdf-nf/2020/polski-sektor-modowy-wplyw-covid19.pdf>



26%

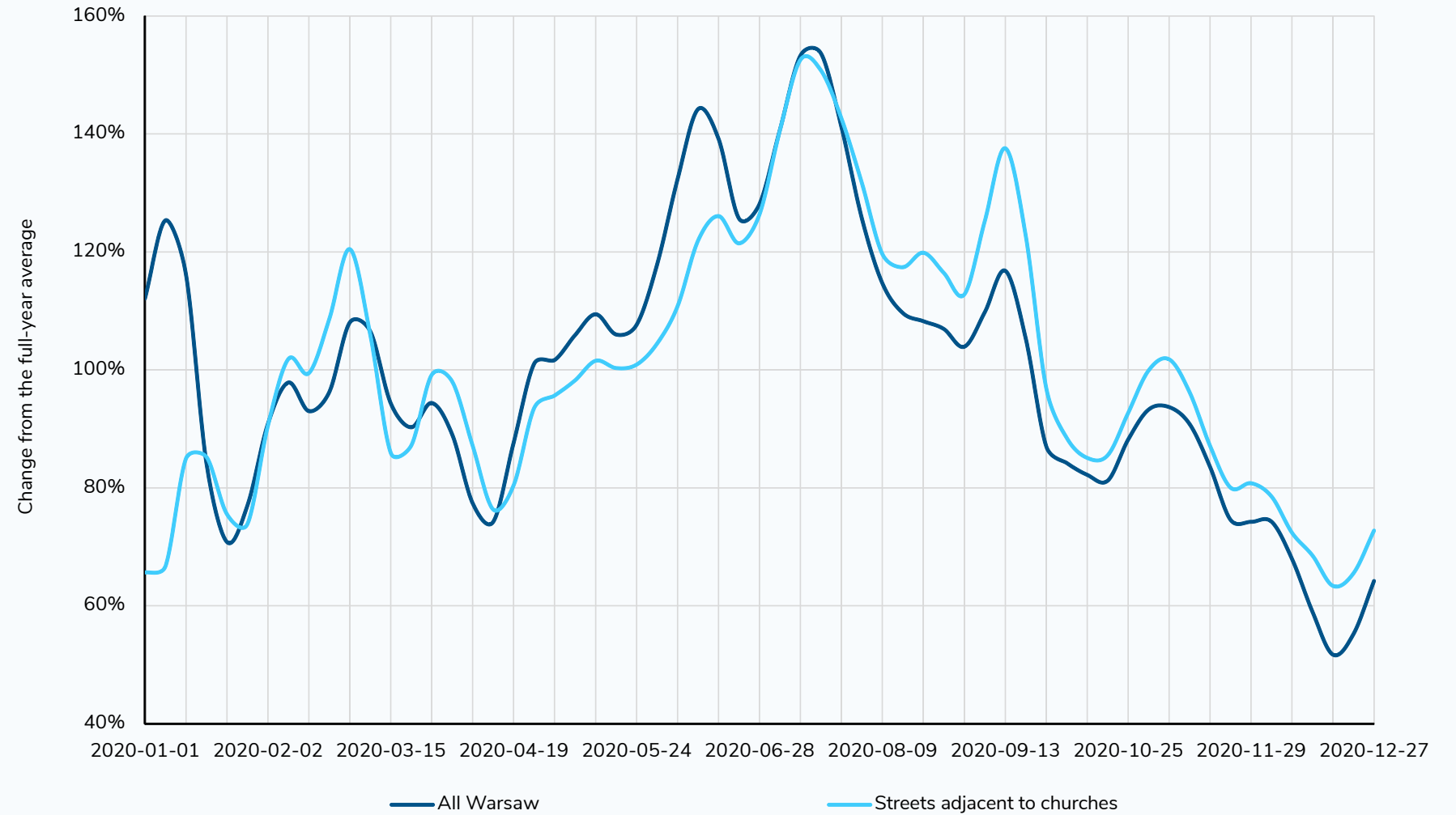
of Poles are more likely to choose their own car than before the COVID-19 pandemic.

Churches

We also analysed pedestrian traffic around 129 churches in Warsaw on consecutive Sundays in 2020. We took into account the hours of 05:00 to 22:00. In this case, the impact of the restrictions was more evident in the spring than in the autumn.

In June, traffic began to return to normal and by the end of the year traffic remained higher in the vicinity of churches than elsewhere. Even in the autumn, when the number of coronavirus cases reached the tens of thousands, people did not stop going to churches.

Pedestrian traffic intensity at churches on consecutive Sundays and holidays in 2020



Sectors

The most attractive locations in Warsaw in terms of retail, catering and tourism.





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AN EXPERT EXPLAINS

How has the retail face of Warsaw changed?

One of the characteristics of the retail market of Warsaw and other Polish cities is that the typical high streets we know from many European cities do not exist. Modern retail is concentrated in shopping centres, whose offer has evolved in recent years towards being spaces combining shopping, services, spending time or entertainment. Many retail brands, particularly popular international clothing brands, when considering a street location in Warsaw, only pointed to the section of Marszałkowska street encompassing Wars Sawa Junior as a potential location for their flagship store. I don't expect the pandemic and the associated changes to significantly affect the creation of new high street locations. This is a much more complex issue that is affected by many factors, such as the lack of quality real estate.

Mokotowska street, Plac Trzech Krzyży or the area around Plac Piłsudskiego have been treated as shopping streets with a defined character, dedicated to niche and premium brands. In terms of attractiveness, Nowy Świat and Krakowskie Przedmieście were a centre for gastronomic outlets, as well as those aimed at tourists and impulse buying.

With the development of office and residential investments and the emergence of a metro transport infrastructure in the near-by Wola district, interest in street venues in this area of the city increased. This included primarily food outlets, service outlets and daily shopping outlets.

Prior to the pandemic we observed an increase in the attractiveness of retail and service premises

where there were office developments combined with residential apartments which were additionally well-connected to the public transport and road networks. The main criterion, regardless of the target group, is the visibility, accessibility, the possibility of highlighting the premises, and above all the high flow of passers-by and people living and working nearby.

With the pandemic and the imposition of restrictions on people's movement and business activities, the locations where people were concentrated in Warsaw changed. The centres of gravity for pedestrian traffic have moved from the city centre and the entire Central Business District area to areas away from the centre and to clusters of housing estates, including, among others: Miasteczko Wilanów, Skorosze or Ursynów, wherever intensive multi-family housing dominates. The city centre, in terms of much needed pedestrian traffic for daily commerce, has become depopulated in the past year.

The analysis of the data on the number of visitors to shopping centres after the first lockdown clearly showed that customers, despite now having the opportunity to do their shopping in shopping centres, still chose those located close to their homes or on the outskirts of Warsaw, thus avoiding the largest retail projects located in the centre or among the office districts in Mokotów.

Customers also preferred smaller centres out of concern for their safety. The same applied to shopping streets located in the centre of Warsaw.

Along with working from home, remote learning at universities and schools, and a lack of tourists and travellers, retail and service establishments, located in attractive pre-pandemic central locations and with previously high flows of people, have suffered.

Our clients in the food service sector, for example, who have stores located in the city centre, along major pedestrian routes, and located in residential neighbourhoods, indicated that turnover in central locations grew the slowest, often reaching a maximum of 30-40% of pre-pandemic turnover. On the other hand, units located in areas of concentrated housing quickly recovered and achieved similar turnover to pre-pandemic levels. The same was true for everyday shopping stores or service outlets.

Since the second half of 2020 we have been able to observe an increase in vacancy and tenant turnover in the centre of Warsaw, especially in the area of Aleja Jana Pawła II and Marszałkowska street. The highest turnover is primarily in food service establishments. More than a quarter of new vacancies, according to our survey from last year, are units left over from cafes, restaurants or bars that had ceased business. In my opinion, this is a short-term trend, related to the radical restrictions on the functioning of this sector, with the simultaneous lack of effective support. In the short term, this trend is likely to intensify as some businesses in this sector will be forced to close or significantly reduce their scale of operations. However, in the medium term, the attractiveness of city centre locations will increase again.





Premises along pedestrian traffic routes will revive when there is a loosening in restrictions, the arrival of tourists and travellers, and the opening of educational establishments. Since there is not a large selection of quality venues available, we estimate that new alternatives will come in to replace the businesses that have closed and those that will unfortunately close in the future. It all depends on the duration of the pandemic.

Taking into consideration the types of retail locations, the pandemic has focused the attention of some chains on the need to diversify locations. Brands that were previously only found in large shopping centres have begun to consider options for locations in retail parks. This is a natural direction, as the restrictions on shop closures have not extended to many smaller retail parks or everyday shopping centres. Depending on the type of offer, we have also seen growing demand for high street units from retail chains looking to diversify their location types. However, in this case, the areas of interest were primarily directed to areas with high concentrations of housing and natural local pedestrian traffic.

The ongoing discussion about the work model of the future indicates that it will most likely be related to hybrid work. This, of course, means a change in the function of offices, their location or the strategy of companies towards offices geographically dispersed across the city rather than concentrated in one place. Such strategies may, on the one hand, weaken the attractiveness of premises located in

large office clusters, especially those without residential fabric, and, on the other hand, have a positive impact on locations outside the CBD or the nearest parts of the Wola district, if a modern office offer appears in them.

What we think will become even more important for potential tenants are the developing areas of high intensity mixed development within Warsaw, with a predominance of multi-family housing, but also including offices and commercial buildings. Each such district has or develops over time its own local main shopping street. Within these districts, tenants will therefore choose premises located on such main streets of neighbourhoods or estates, with good visibility, enabling appropriate signage, and ideally also with parking spaces available.

To date, the offer in such areas has consisted mainly of food, service and everyday shopping categories with a predominance of popular and specialty grocery offerings. Over the last few months we have observed interest in such places among tenants from the sectors dealing in interior decoration and home accessories, medical and so-called wellness services, shops with accessories, equipment and sports clothes, or hobby shops. A group of fashion brands, particularly those targeting the casual and budget sector, are also selectively considering options for high street premises. For some sectors, e.g. electronics, the availability of parking for customers still remains a constraint, so despite the evident demand for this assortment category, it is focused on development in retail parks, small

local centres and typical shopping centres.

With the prolonged pandemic, discussions have emerged within the industry and in the media about its impact on high street development. Some are even predicting the renaissance of the high street. In my opinion, such an assumption and prediction is still premature. Whether high streets develop depends on many factors, most importantly the behaviour of the customers themselves. One of the observed and strongly defining trends is "localness", or the search for what is close, familiar and convenient. This trend manifests itself in many ways, one of which is the growing need for retail and service offerings close to where people live and work. The ongoing discussion about changing working patterns towards hybrid working may further influence the increasing attractiveness of retail locations close to people.

Another trend that is thriving in large cities is to create multi-functional projects rather than mono-functional ones. Only a diverse urban fabric is able to maintain its attractiveness to customers, users and tenants in the long term.

We already have examples of creating such spaces in Warsaw, which can offer quality retail space in central locations of Warsaw, starting with Elektrownia Powiśle or the area of Browary Warszawskie. The Fabryka Norblina development, which is currently under construction and is the closest to the city centre, is a very good example of

a multi-functional, urban project that meets the needs of both the users living, staying and working in the vicinity, and tenants who plan to diversify their locations and go beyond typical shopping centres. The authenticity of such places, their level of integration into the urban fabric, additionally influences the commercial attractiveness of the whole area around them.

The pandemic accelerated and polarized several trends whose signals we had already observed. It has certainly sparked new trends as well, but those affecting city street retail real estate are still some time away. Each city has one centre that evolves and expands, maintaining its commercial appeal. However, it is also a good direction to build central places and streets within local neighbourhoods and estates, where retail, services and catering will flourish and which will simply be vibrant with urban life.





Commerce

In Warsaw, as in the rest of Poland, shopping streets have not fully developed. According to the reports from companies analysing the real estate market for commerce, Poles are still more likely to visit shopping centres than do their shopping "in town".

According to the report from Colliers, gastronomic services began to encroach on streets that were traditionally associated with retail, such as Chmielna street, Mokotowska street or Plac Trzech Krzyży, before the pandemic began, and tourist traffic mixed with that associated with shopping. Nevertheless, the extensive city centre district between Nowy Świat and Żelazna street as well as Puławska, Francuska, Targowa, and Grójecka streets and Plac Wilsona are considered to be the main retail streets¹. CBRE's publications focus on Chmielna street, Marszałkowska street, Aleje Jerozolimskie, Nowy Świat, Plac Trzech Krzyży and Mokotowska street². We analysed the streets listed, selecting only those hours when non-network stores are mostly open, i.e. between 11:00 and 19:00.

Of the selected shopping streets, Nowy Świat generates the most traffic with over 2110 people per hour. There are also a lot of people on Świętokrzyska beyond Marszałkowska towards the Rondo ONZ roundabout the intensity of pedestrian traffic drops by half. Next in the ranking are Chmielna street,

Targowa street and the northern part of Marszałkowska street. There, on the eastern side, four times as many people pass the Domy Centrum side as from the Plac Defilad side. It is this part of Marszałkowska and Mokotowska that is still dominated by retail rather than gastronomy, which is more and more boldly encroaching on Chmielna, Nowy Świat and Świętokrzyska streets. Mokotowska and Bracka streets, where the Vitkac department store is located, are characterised by relatively low pedestrian traffic. It is still the food outlets, transfer points and tourist facilities that attract more people than typical shopping streets.

We also investigated the surroundings of shopping centres. For our analyses, we took into account traffic on Saturdays between 07:00 and 22:00 (people potentially interested in shopping). The top five list includes the most popular shopping centres in Warsaw: CH Wileńska, Złote Tarasy and Galeria Mokotów. The presence of Galeria Renova located in the Bródno district in the ranking may be a surprise. This is due to the peculiarities of the place – a high density location with trams.

¹ http://docs.colliers.pl/reports/Colliers-Raport_Warszawskie_Ulice_Handlowe.pdf

² <https://www.cbre.pl/pl-pl/raporty/warszawskie-ulice-handlowe>

The most visited shopping streets

Average pedestrian traffic between 11:00 and 19:00

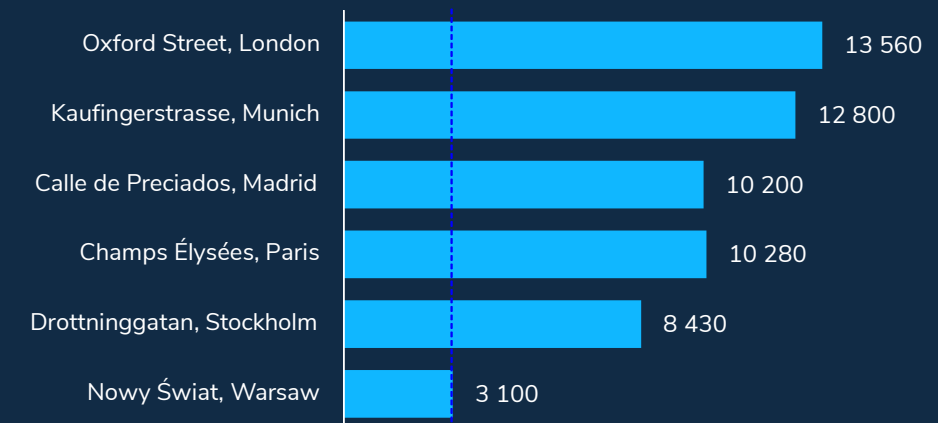


- 1 Nowy Świat – 2110 persons/hour
- 2 Świętokrzyska, eastern part – 1200 persons/hour
- 3 Chmielna – 1090 persons/hour
- 4 Targowa – 1070 persons/hour, traffic highest at Aleja Solidarności, decreasing towards Kijowska street
- 5 Marszałkowska, northern part – 1050 persons/hour, 4 times more people on the eastern side than on the western side
- 6 Al. Jerozolimskie, eastern part – 920 persons/hour
- 7 Marszałkowska, southern part – 840 persons/hour
- 8 Al. Jerozolimskie, western part – 820 persons/hour
- 9 Plac Trzech Krzyży – 720 persons/hour, unevenly distributed traffic, most people at the eastern end
- 10 Świętokrzyska, western part – 700 persons/hour
- 11 Mokotowska – 520 persons/hour, on Koszykowa street this number increases to 1000 persons/hour
- 12 Bracka – 480 persons/hour

Nowy Świat compared to other shopping streets in Europe

Pedestrian traffic on Warsaw's shopping streets is still far from that of Western Europe. Four times as many people pass through Oxford Street in London than through Nowy Świat.

Number of pedestrians per hour in the afternoon peak period 14:00-16:00



Ranking of shopping centres in Warsaw in terms of traffic intensity

Traffic on Saturdays from 07:00 to 22:00 on adjacent streets

No.	Shopping centre	Number of persons per hour
1	CH Wileńska	870
2	Złote Tarasy	820
3	Galeria Renova	790
4	Galeria Mokotów	570
5	Wola Park	530

What does the development of high streets depend upon?

In Warsaw, the retail market has been largely dominated by shopping centres, where the most popular brands among consumers are located. Meanwhile, in many cities of Europe and the world, the locations of flagship stores are usually shopping streets, whose offer attracts residents and tourists, and which are the showcase of their cities.

The topic of reviving retail on Warsaw's streets has returned again now, during the pandemic, when many brands, for example fashion brands, faced the consequences of the lockdown, i.e. the suspension of shopping centres.

In this situation, more and more stores are looking for locations that will ensure their business continuity. Thus, the natural direction of their migration would be the retail streets that were not affected by COVID-19 restrictions. However, in order to increase their attractiveness, it is necessary to create a coherent strategy that assumes close cooperation between the city and private owners. In addition, the complicated bidding procedures and comparison of offers need to be simplified, because ten-

ants, especially large chain companies, expect the process of acquiring premises to be simpler and faster, and landlords themselves are prepared to be somewhat flexible in negotiations.

Another important step is the very way in which high streets are managed, which should be similar to the management of shopping centres and which aims, among other things, to properly diversify the tenant portfolio. This allows streets to comprehensively meet the shopping needs of customers and builds customer loyalty. Currently, however, it is the gastronomic sector, which is facing a number of difficulties caused by COVID-19, that ranks first among the most popular category of tenants of high street premises. On the other hand, the fashion offer, i.e. the dominant type of shops in shopping centres, is quite modest in Warsaw shopping streets. However, by implementing a coherent city centre retail strategy, Warsaw's shopping streets have a great opportunity to increase their potential to become a viable alternative to shopping centres. It should be noted that the city has already done some work to counteract the shrinking retail

offer on the capital's streets. Two years ago, on behalf of Warsaw City Hall, our team conducted a study on the basis of which we prepared recommendations aimed at identifying directions for the development of city centre retail on the section of Marszałkowska from Plac Zbawiciela to Aleje Jerozolimskie. At the time, we pointed out that among the factors that could support it, an increase in pedestrian traffic was necessary.

In the case of our study area it would therefore be helpful to build the omitted metro station A12 – Plac Konstytucji, but also to create a representative, high quality and green public space that will attract residents. Of course, it is important that the streets are friendly to the customers themselves, and here it is necessary, for example, to analyse the possibility of building additional pedestrian crossings, which would positively affect the circulation of customers, as well as the renovation of dilapidated town houses.



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Tourism

The year 2020 was a very difficult year for the tourism industry. CitiesAI data shows how foot traffic has evolved around the most popular tourist attractions.

In a report released by Warsaw City Hall in 2019, the most popular places to visit in the capital include the Old Town, the Royal Łazienki park, the Warsaw Uprising Museum, the POLIN Museum of the History of Polish Jews and the Wilanów Palace. We looked at how pedestrian traffic was shaping up in these neighbourhoods in 2020.

It should be borne in mind that 2020 was a very difficult year for the tourism industry. This is shown by the Central Statistical Office's (GUS) data on the occupancy rate in Warsaw's accommodation facilities. Even in the summer there were two or three times fewer tourists than last year. What's more, as AirBnB's 2020 report shows, the list of most searched destinations is no longer prestigious cities like Paris, New York or Barcelona, but open spaces close to nature, such as the rural countryside of Derbyshire in the UK or Muskoka Lakes, a few hours' drive from Toronto¹.

According to the CitiesAI study, the distribution of hours in tourist destinations is dependent on the environment. The high morning peak and low

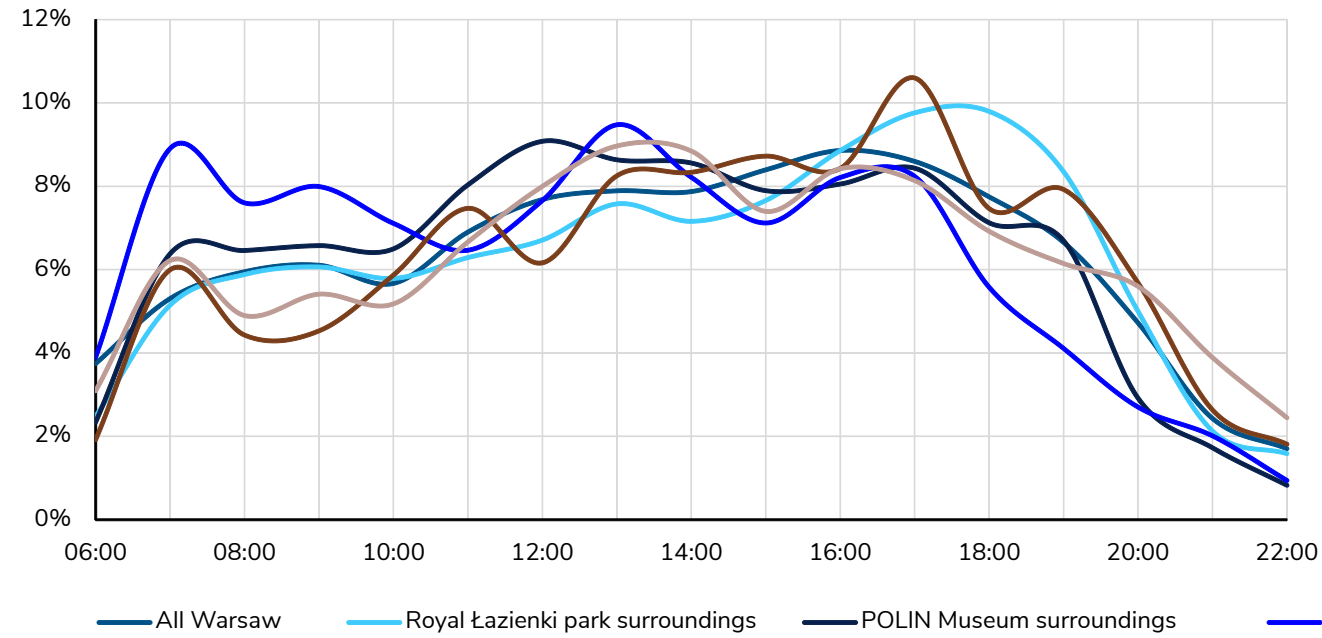
evening traffic on weekdays in the vicinity of both the Warsaw Uprising Museum and POLIN museum suggests that the impact of tourist traffic on total pedestrian traffic in the area is small. In the case of the Warsaw Uprising Museum, the area is dominated by office buildings and housing. The Museum of Polish Jews, on the other hand, is located in the middle of the residential district of Muranów. We can say that larger complexes – the Old Town, the Royal Łazienki park or the Wilanów Palace with its park – have a greater impact on the character of pedestrian traffic in the area than single point attractions, to which tourists are often transported by bus.

It is more visible when we compare traffic during the week and at weekends around the Warsaw Uprising Museum and around the Wilanów Palace. In the first case there is a predominance of traffic on working days over weekends, in the second case – the reverse. Also keep in mind that the museums were closed for the pandemic period, which also negatively affected foot traffic around them.

¹ <https://news.airbnb.com/2021-travel/>

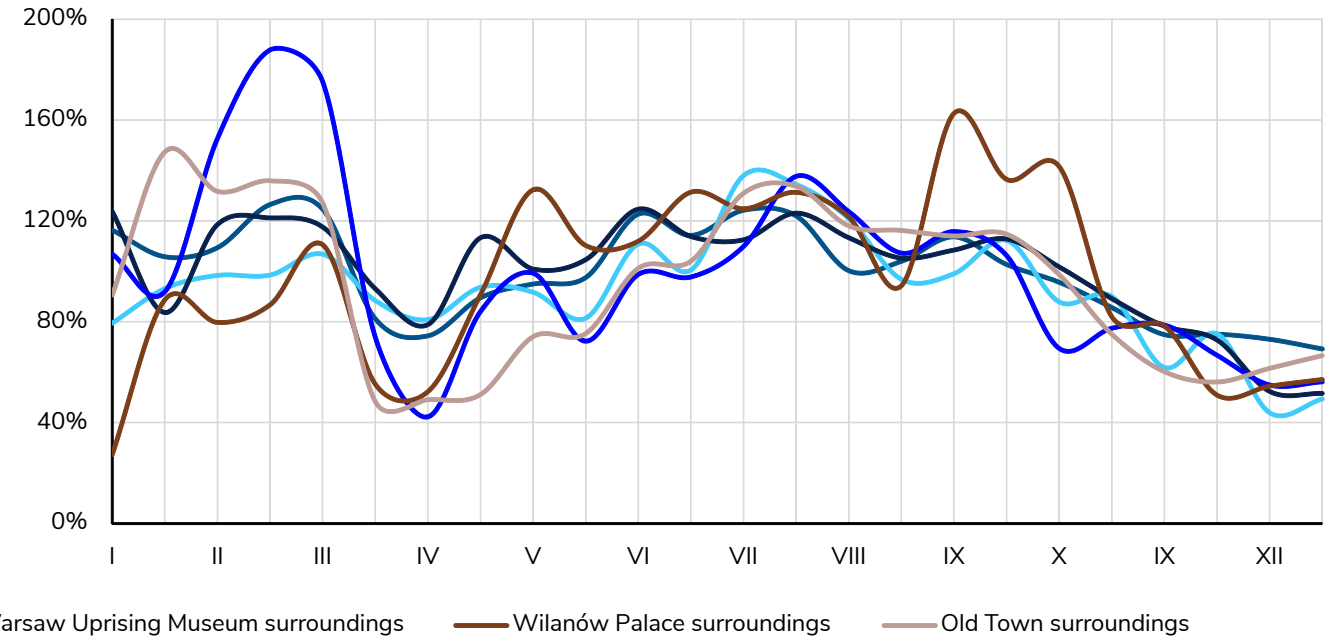
Hourly distribution of pedestrian traffic in selected tourist sites

100% – total pedestrian traffic in a given area during the day

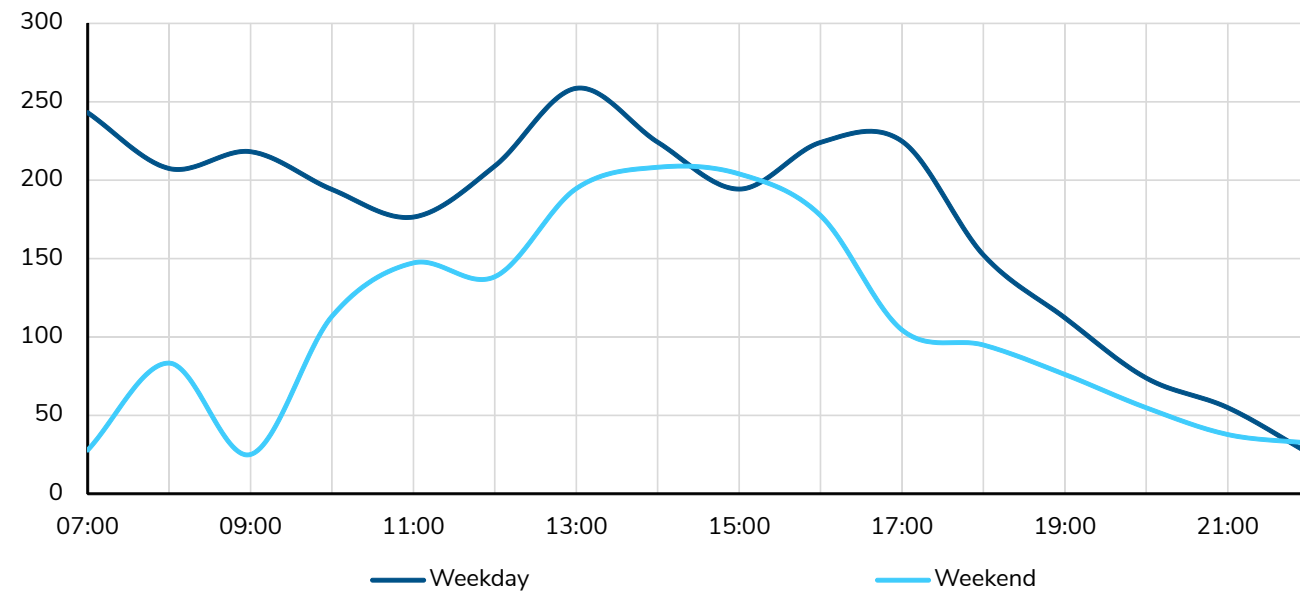


Change in pedestrian traffic at selected tourist sites in relation to the annual average

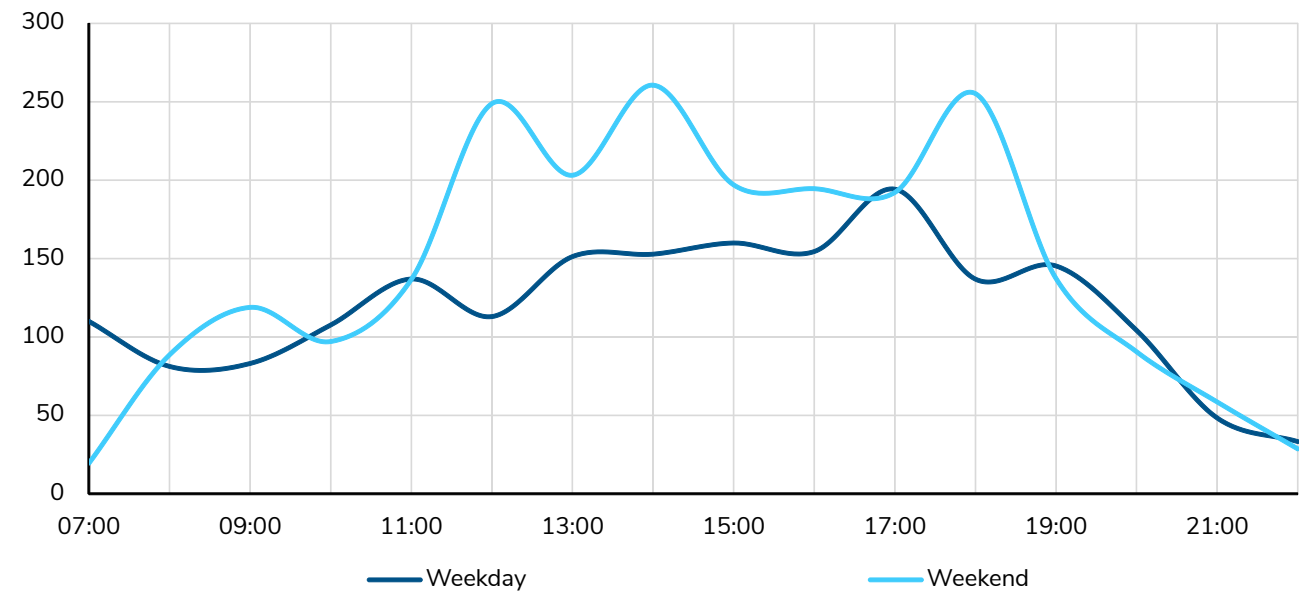
100% – average annual pedestrian traffic volume for the given area



Warsaw Uprising Museum surroundings – number of pedestrians/hour

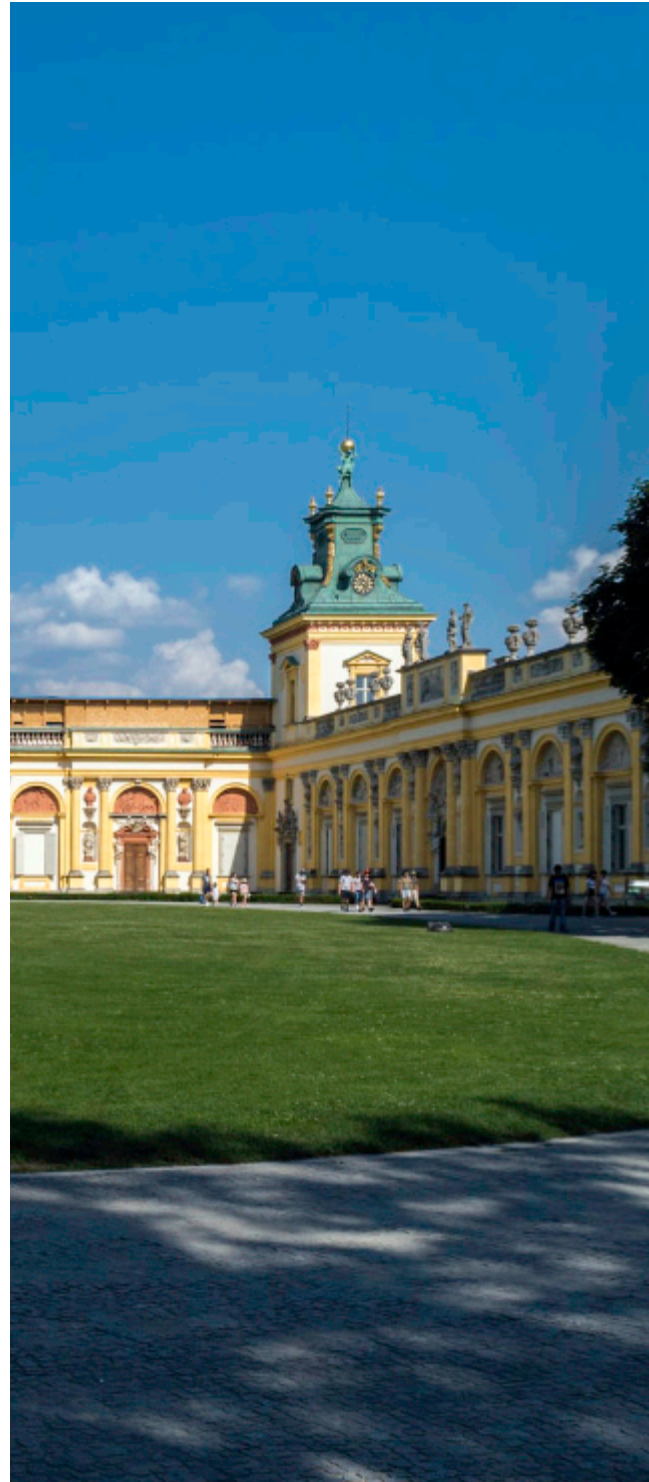


Wilanów Palace surroundings – number of pedestrians/hour



Of the locations analysed, it was the Old Town that was most depopulated during the spring wave of the pandemic and it was not until late June and early July that traffic recovered there.

Relatively low changes were noted around the POLIN Museum, which may mean that pedestrian traffic is generated mainly by people living there. An interesting case is the area around the Wilanów Palace, where the peak of pedestrian traffic falls in the autumn wave of the pandemic – September and October. The Royal Garden of Light has been operating in Wilanów since 10th October, which could bring more visitors to the area by the end of 2020.





Gastronomy

Where is there a vibrant night-life in Warsaw? The Vistula Boulevards, Francuska street, Plac Teatralny and Aleja KEN are places on the map of the capital where people are more likely to go out in the evening than in the morning.

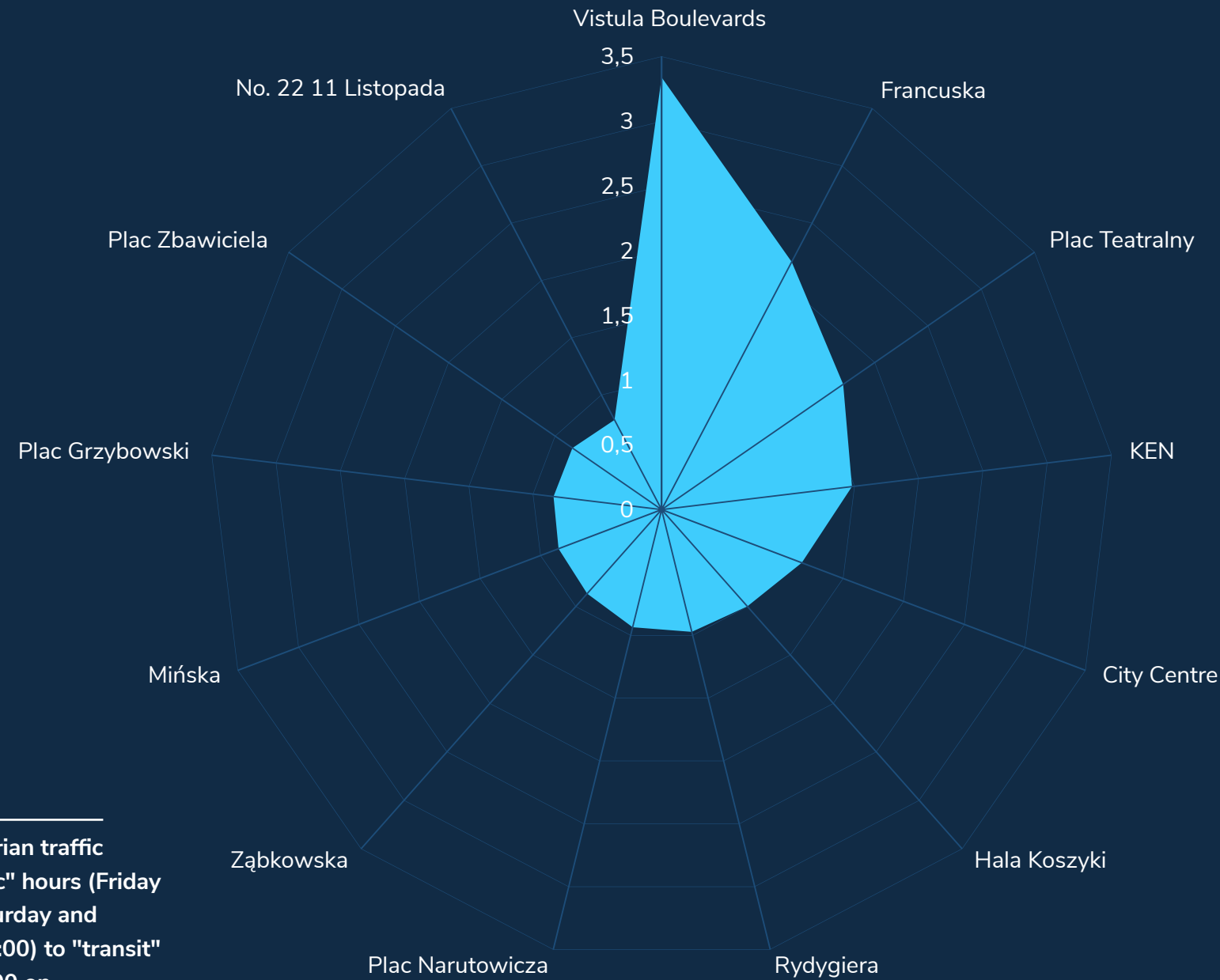
We analysed thirteen popular places on the gastronomic map of Warsaw. They are located in different districts: the central section of the Vistula Boulevards, the centre of Warsaw between Nowy Świat, Marszałkowska, Żurawia and Świętokrzyska streets, Plac Zbawiciela, Plac Grzybowski, Plac Teatralny, Koszykowa street together with Hala Koszyki, Plac Narutowicza, Francuska street, the Soho Factory area, Stara Praga, and the backyard of No. 22 11 Listopada street (Hydrozagadka, Skład Butelek and Chmury), Rydygiera street and Aleja KEN between Wąwozowa and Jeżewskiego streets. The data collected comes from the period when pandemic-related restrictions were least severe, between 18th May and 25th October 2020.

In each of these areas, urban traffic has a different character and this traffic is distributed differently on weekdays and weekends. In the vicinity of Plac Grzybowski, weekend traffic equals but does not exceed weekday traffic. The hourly distribution is even throughout the day. On the Vistula Boulevards, on the other hand, the highest peak falls between 18:00 and 21:00, and there are twice as many people at the weekend as during the week.

Based on the hourly breakdown, we created a ranking of the "gastronomisation" of sites i.e., the dominance of pedestrian traffic compared to traffic associated with evening and bar life. For this purpose, we compared pedestrian traffic from the afternoon hours (15:00 to 23:00) on Saturdays and Sundays and evening hours on Friday (18:00 to 23:00) with morning traffic on weekdays (06:00 to 11:00), which is most often associated with travel to work or shopping.

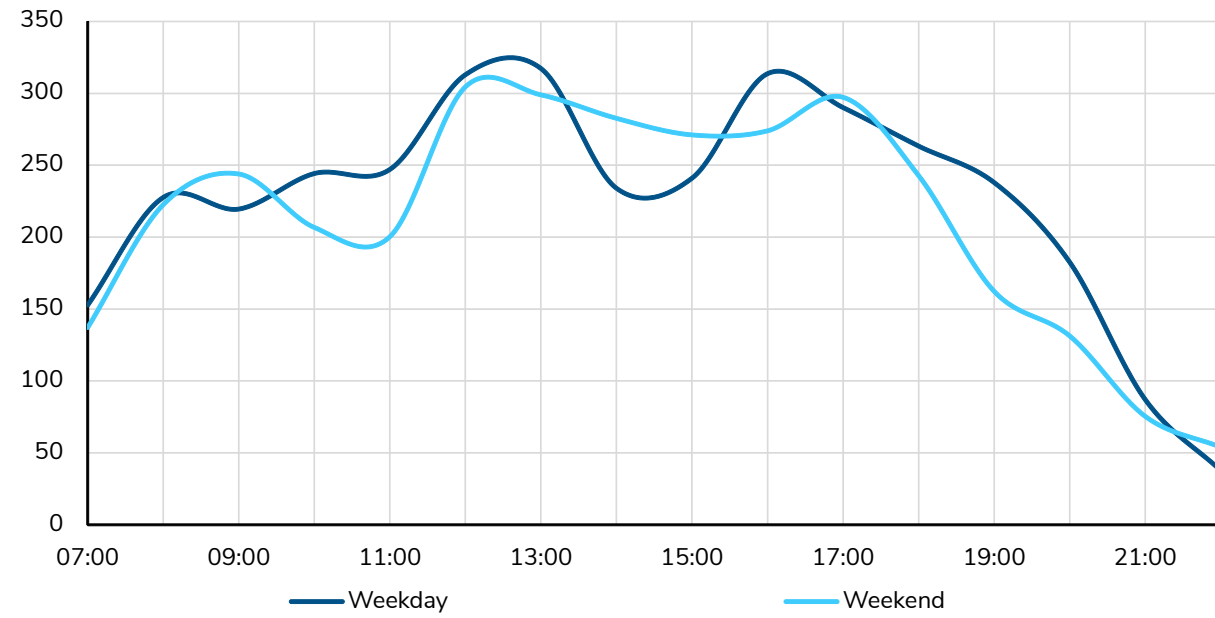
The highest gastronomic index was found for the Vistula Boulevards, followed by Francuska street, Plac Teatralny and Aleja KEN. In these places people are more likely to go out in the evening than in the morning. It is interesting because Francuska and Aleja KEN are axes of Saska Kępa and Ursynów respectively – typically residential districts. The low score of Plac Zbawiciela and Plac Grzybowski may come as a surprise – this is due to the fact that both places generate a lot of traffic during the day (the very centre of Warsaw), so the gastronomic-related traffic is small on a daily basis.

The "Gastronomisation" index

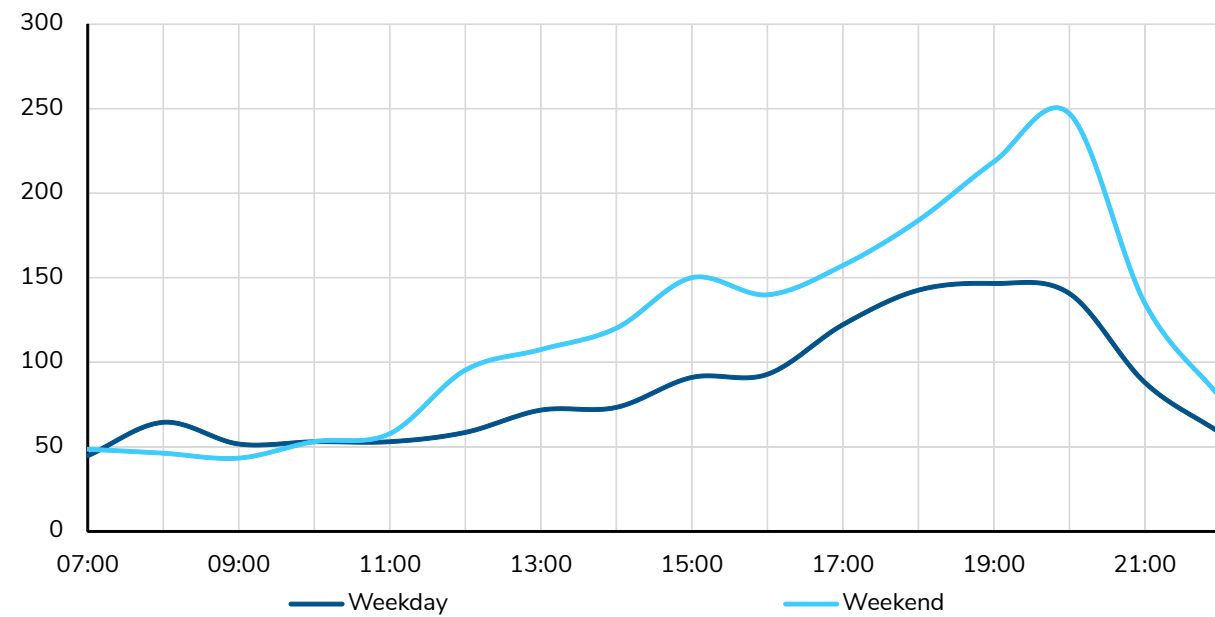


The index of pedestrian traffic during "gastronomic" hours (Friday 18:00 to 23:00, Saturday and Sunday 15:00 to 23:00) to "transit" hours (06:00 to 11:00 on weekdays).

Vicinity of Plac Grzybowski – number of pedestrians/hour



Vicinity of the Vistula Boulevards – number of pedestrians/hour



The densest spots on Francuska after 18:00 on weekends

- ▶ between Lipska and Berezynska streets, where, among others, the Mech and Wines&More restaurants are located
- ▶ at the intersection with Walecznych street, where Lukullus and the Francuska 30 Cafe&Bar are located
- ▶ between Obrońców and Zwycięzców streets, where among others, Pizzeria Dominium and Trattoria Rucola are located

Districts

Pedestrian traffic and popular places
in different districts of Warsaw.





Bemowo

Number of inhabitants: 125,110

Busiest week in 2020: 1st-7th June

Least busy week in 2020: 21st-28th December

Average number of persons per 100 m of pavement: 1.5

- Powstańców Śląskich (Synów Pułku bus stop) – morning peak in the district. Tram stop, surrounded by vegetable stalls and schools.
- Batalionów Chłopskich (Kaufland) – evening and weekend peak in the district. Retail site, also an ice cream outlet nearby and a residential area.



Białołęka

Number of inhabitants: 129,106

Busiest week in 2020: 3rd-10th February

Least busy week in 2020: 13th-20th April

Average number of persons per 100 m of pavement: 0,9

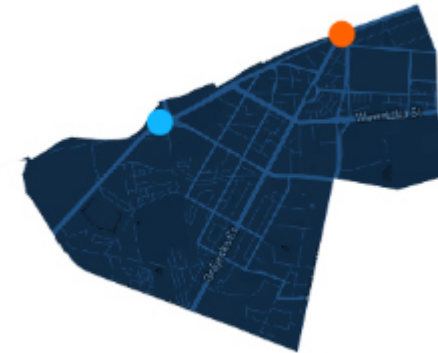
- Modlińska corner of Żerańska – morning peak in the district. Bus stop, intersection of major streets.
- Skarbka z Gór street – evening and weekend peak in the district. Retail area and many residential areas.



Bielany

Number of inhabitants: 131,592
 Busiest week in 2020: 2nd-9th March
 Least busy week in 2020: 21st-28th December
 Average number of persons per 100 m of pavement: 1.1

- Wawrzyszew metro station and Wolumen street – morning peak in the district. An interchange point and a marketplace.
- Młociny/Galeria Młociny metro station – afternoon, evening and weekend peak times in the district. An interchange point and a place of commerce. A drop-off point for Warsaw residents to the Młociński Forest.



Ochota

Number of inhabitants: 82,484
 Busiest week in 2020: 17th-24th February
 Least busy week in 2020: 21st-28th December
 Average number of persons per 100 m of pavement: 1.9

- Plac Zawiszy – morning peak in the district. Interchange with trams, railways and buses.
- Warsaw West Railway Station – evening and weekend peak in the district. A transfer point, close to Park Zachodni and the CH Reduta and Blue City shopping centres.



Mokotów

Number of inhabitants: 218,265
 Busiest week in 2020: 2nd-9th March
 Least busy week in 2020: 21st-28th December
 Average number of persons per 100 m of pavement: 1.8

- Puławska corner of Rakowieckiej – morning and afternoon peak in the district. Transfer point between Lower Mokotów, Upper Mokotów and the city centre. Tram and bus stop.
- Puławska corner of Dąbrowskiego – evening and weekend peak hours in the district. Service outlets, a square, the vicinity of Park Morskie Oko and gastronomic outlets.



Praga-Północ

Number of inhabitants: 63,480
 Busiest week in 2020: 7th-14th September
 Least busy week in 2020: 21st-28th December
 Average number of persons per 100 m of pavement: 1.6

- Plac Wileński – morning, evening and weekend peak. The most important communication point because of the metro, railway, tram, city and long-distance buses, and because of the CH Wileńska Shopping Centre – an important retail point.
- Corner of Targowa and Ząbkowska and the Bazar Różyckiego market – the afternoon peak in the district. A place of trade and walks by the inhabitants of the Praga district.



Praga-Południe

Number of inhabitants: 180,789
 Busiest week in 2020: 13th-20th July
 Least busy week in 2020: 21st-28th December
 Average number of persons per 100 m of pavement: 1.6

- Rondo Wiatraczna – morning and afternoon peak in the district. The most important communication point - transfers from buses to trams. Also an important retail site.
- Francuska – weekend peak in the district. A street with restaurants near the Skaryszewskiego Park. An avenue used for people taking walks that attracts Varsovians from other districts.



Rembertów

Number of inhabitants: 24,513
 Busiest week in 2020: 4th-11th May
 Least busy week in 2020: 30th November - 6th December
 Average number of persons per 100 m of pavement: 0.3

- Rembertów-Ratusz – simultaneous morning, afternoon, evening and weekend peak in the district. District centre with bus stop and services, square and town hall.



Śródmieście

Number of inhabitants: 113,713
 Busiest week in 2020: 24th February - 1st March
 Least busy week in 2020: 13th-20th April
 Average number of persons per 100 m of pavement: 2.7

- Rondo de Gaulle'a – morning peak in the district. Transfer point between buses and trams. Public administration buildings and service points are in the vicinity.
- Central Railway Station / Złote Tarasy – weekend peak in the district. Shopping centre, a tourist area due to the train station and the proximity of the Palace of Culture and Science.



Targówek

Number of inhabitants: 124,992
 Busiest week in 2020: 3rd-10th February
 Least busy week in 2020: 21st-28th December
 Average number of persons per 100 m of pavement: 1.1

- Łojewska corner of Chodecka – morning peak in the district. Bus stop, vegetable stalls and supermarket.
- Atrium Targówek – a large shopping centre. The Bródnowski Forest (Las Bródnowski) is also in the vicinity.

92 300

This is the average number of
Varsovians on the streets between
07:00 and 22:00.





Ursus

Number of inhabitants: 61,312
 Busiest week in 2020: 31st August - 6th September
 Least busy week in 2020: 10th-17th February
 Average number of persons per 100 m of pavement: 0.9

- Wojciechowskiego corner of Keniga – morning peak in the district. Bus stop and nearby supermarket and kiosks. A residential estate.
- Skoroszevska corner of Dzieci Warszawy – evening and weekend peak in the district. The intersection of major streets in the district, with service points in the vicinity.



Ursynów

Number of inhabitants: 151,304
 Busiest week in 2020: 1st-8th June
 Least busy week in 2020: 21st-28th December
 Average number of persons per 100 m of pavement: 1.1

- Megasam bus stop next to Surowieckiego street – morning peak in the district. Bus stop and nearby supermarket, vegetable stalls and a post office.
- Natolin metro station – afternoon and weekend peak in the district. Both a transfer point and a place of commerce: the KEN Centre shopping centre and restaurants nearby.



Wawer

Number of inhabitants: 78,244
 Busiest week in 2020: 29th June - 5th July
 Least busy week in 2020: 10th-17th February
 Average number of persons per 100 m of pavement: 0.3

- Children's Health Centre – morning peak in the district. An important hospital in the city.
- Trakt Lubelski corner of Zwoleńska – weekend peak in the district. Nearby Catholic church and grocery stores.



Wesoła

Number of inhabitants: 25,798
 Busiest week in 2020: 9th-16th November
 Least busy week in 2020: 13th-20th April
 Average number of persons per 100 m of pavement: 0.5

- Brata Alberta corner of Wspólna – the morning peak in the district. The centre of the Zielona Grzybowa housing estate. Bus stop and supermarkets in the surrounding area.
- Trakt Brzeski corner of Jana Pawła II – evening peak in the district. The intersection of two important streets in Stara Miłosna. Several shopping and gastronomic outlets in the area.



Wilanów

Number of inhabitants: 42,134
 Busiest week in 2020: 7th-14th September
 Least busy week in 2020: 7th-14th December
 Average number of persons per 100 m of pavement: 1.4

- morning, afternoon and evening peak hours in the district. A street with a retail and gastronomic character. The most important street of Miasteczko Wilanów district.
- Powsin Culture Park – the weekend peak in the district. A recreational site of citywide significance.



Wola

Number of inhabitants: 141,407
 Busiest week in 2020: 2nd-9th March
 Least busy week in 2020: 21st-28th December
 Average number of persons per 100 m of pavement: 2.2

- Rondo Daszyńskiego – morning and afternoon peak hours in the district. Transport hub with trams, metro and buses. The centre of the Wola office district.
- The “Femina” cinema – weekend peak in the district. An important interchange place, a large number of service, catering and cultural points. It borders with the city centre.



Włochy

Number of inhabitants: 43,613
 Busiest week in 2020: 17th-24th February
 Least busy week in 2020: 21st-28th December
 Average number of persons per 100 m of pavement: 0.9

- Aleja Krakowska corner of Bakalarska – morning, afternoon and weekend peak hours in the district. It houses the district's town hall, open marketplace and is an important transfer point.
- Chopin Airport – evening peak in the district. International airport with a 24-hour terminal.



Żoliborz

Number of inhabitants: 52,792
 Busiest week in 2020: 29th June - 5th July
 Least busy week in 2020: 12th-19th October
 Average number of persons per 100 m of pavement: 1.0

- Plac Wilsona – peak morning, evening and weekend hours in the district. The most important communication point – metro, tram and buses. Service, gastronomic and cultural points along with a nearby park.
- Rydygiera corner of Anny German – afternoon peak in the district. The central street of Żoliborz Artystyczny with a commercial and gastronomic character.

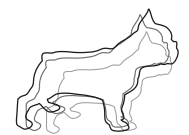
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