

Pedestrian mobility in the entrance zones of the gated communities in Wrocław, Poland, during COVID-19 pandemic



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This paper outlines the case study of pedestrian mobility in one of the residential estates in Wrocław, Poland. The pedestrian mobility was examined in gated community, which counts several hundred apartments. The entrance to the estate is provided by two wickets.

Due to a limited number of entrances, gated communities are exposed to specific phenomena. The COVID-19 pandemic and the fear of virus transmission have changed the anthropogenic environment and therefore architecture as well as urban design will never be the same again. The occurrence of the SARS-CoV-2 virus has arisen new research questions regarding uncertainty in urban space management after the pandemic and the possibility of creating new urban design, which will be based on social distance and provide the walkable city trend [cf. 1.]. One of the strategies for preventing the transmission of the virus is introduction of laws on social distance or covering the mouth and nose enforced by police officers, even in “unpopular in public, private and commercial spaces, in lived environments as diverse as informal settlements and gated communities” [2, p. 11]. Therefore, social distance and quarantine have become a serious problem and a design challenge. Chen et al. [3] emphasized the need for implementation of non-contact services in gated communities, especially delivery. It could be based on mathematical algorithms. The aim of such activities is to avoid contact with other people. Based on the principles of social distancing, some governments decided to develop guidelines for preventing COVID-19 transmission in gated communities [cf. 4.], e.g. by proposing the separation of entrance and exit gates.

The subject of the research was raised based on literature analysis, possible virus transmission in the entrance zones of a gated communities and research interests of the authors. The pandemic period brought into light governments and societies unpreparedness to extreme situations. Narrow pedestrian links, fences

and codes in the entrance zones giving a subjective sense of security have turned out to be a threat in recent months. Hundreds of people entering and leaving the estate may keep their distance. However, in the entrance zones they are forced to approach less than the recommended two meters distance. It is necessary to highlight that the aim of the paper was not the essence of creating gated communities or even their evaluation. Gated communities constitute an interesting area of urban research. Although residents of non-gated communities are allowed to move freely by choosing convenient paths, residents of gated communities are forced to move along defined footpaths.

Because of the pilot nature of the study, the authors were motivated to analyse pedestrian traffic during a pandemic and archive the changes taking place at such particular moment for the country. The main aim of the research was the analysis of pedestrian traffic in the entrance zones of a gated community in the context of epidemiological safety. Subsequently, the additional goal was to document the dynamic of changes in the number of pedestrians during the implementation of subsequent restrictions.

Gated communities in the urban structure

The term of gated community has been variously and multidimensionally defined [5]. Atkinson and Blandly [6] and Blakely [7] noted that gated communities are residential areas with restricted access that normally would be considered as the category of public spaces. Additionally, they mentioned the usage of physical barriers such as walls and fences or gates to separate the estate from the external environment.

The occurrence of monitoring systems and security staff was also emphasized. Although the ghettoization of space is created by physical barriers, it significantly changes the social structure, which generates additional divisions [8]. Homogeneity is an important attribute of the gated communities, which is not particularly related to the formation of enclaves with specific psycho-social features, e.g. enclaves of poverty or exclusive estates [9].

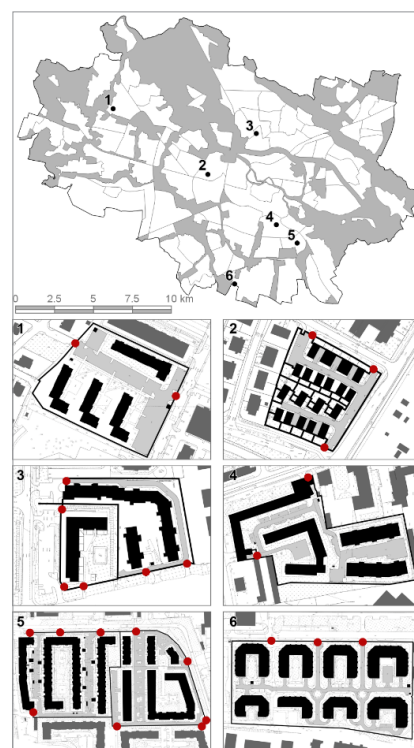


Fig. 1. Localisation of gated communities in the urban units of Wrocław and their spatial structure

Tab. 1. Characteristics of the gated communities in Wrocław

Number of the estate – as in Fig. 1.	1	2	3	4	5	6
Urban unit	Stabłowice Stare	Popowice	Polanka-Różanka	Huby	Tarnogaj	Partynice-Oltaszyn
Localisation in urban structure	suburban	central	central	central	central	suburban
Number of gates	2	3	6	2	9	4
Characteristic of gates	combined with roads	separated	separated	blended	separated	separated
Entrance zone	unexposed	unexposed	unexposed	unexposed	exposed	exposed
Fabric of the fence	expanded metal	expanded metal	expanded metal	wall, expanded metal, urban block	wall, expanded metal, urban block	metal railing
System of the gating	around plot	Around plot, between buildings	Around plot, between blocks	around plot	Around plot, between blocks	around plot
Common space	between buildings	-	inside blocks	inside blocks	inside blocks	inside blocks
Est. number of flats	232	76	410	537	907	576

The progressive development of gated communities has enabled their typology. Blakely and Snyder [10], as far back as 1997, pointed out the types of such residential development depending on: lifestyle communities, elite communities and security zones – particularly in the suburbs affected by poverty. Janik [11] classified gated communities in the context of social segregation, Szczepański [9] in the context of economic status, and Gąsior-Niemiec et al. [12] both in the context of location in Warsaw and the types of separating the estate from the external environment.

“The dominant paradigm that has fuelled the rise of gated communities, from the US to New Zealand, the Middle East to West Africa, China to Latin America, is growth, which is seen as synonymous with progress.” [13, p. 9]. However, as noted by Kovács and Hegeds [14] high-status gated residential enclaves appeared in East-Central Europe after the collapse of communism and emphasizing social segregation. Currently, gated communities are dispersed in urban structures. As evidenced by the research of Atkinson and Flint [15], gated communities are not physically and socially integrated with neighbouring areas in many cases and are even intentionally separated and isolated, thus exacerbating the negative tendencies of segregation in cities, which create so-called “havens of social withdrawal”. Although Roitman [cf. 5.] claimed that gated communities display both positive and negative spatial effects, they can be also perceived as a spatial response of social groups to the processes of globalization [5], [16].

Global market trends in housing still show high development potential for gated communities [17]. Thus, Blandy and Pearson [16] described the role of the spatial planning system in shaping the spatial order. City councils in Poland have been able to pass the landscape resolutions since 2015, which forbid gating of housing estates [18]. However, only 6% of councils introduced resolutions on the preparation of such projects in 2017 and less than 1% of communes enacted landscape

resolution [19]. Liberal policy before 2015 and the reluctance of local governments to enact proper regulations resulted in the increased popularity of gated communities in Poland, which became more and more common in cities [20]. Both in Poland and the world, it led to a combination of interests and activities of many actors, who find strategic and structural conditions ensured by the spread of gated communities as a vital value [21].

Research area, tools, and methods

Wrocław is located in the southwest of Poland, in the eastern part of the Dolnośląskie Province, on the Odra River. As shown by the literature review, similarly to other cities, gated communities in Wrocław are located dispersal, both in the central area and suburbs. After 2000, a significant increase in new housing estates can be observed in the city, which, together with the achieving of the investment, are gated by developers. Due to the above, six gated communities built after 2005 in Wrocław were analysed – as shown in fig. 1. The authors chose these examples (realized in the last 15 years) to show that gated communities are being built all over the city, both in the centre and in the suburbs. Moreover, they include various types of multifamily housing.

The characteristic of the estates is presented in tab. 1. The gated communities are located in different areas of the city. The number of gates is not correlated with the number of flats and the entrances are not particularly exposed, especially architecturally. In most cases, the areas are completely gated, sometimes part of the urban block is a fragment separating the estate, sometimes there are also additional barriers between individual buildings.

The housing estate marked no. 4 in fig. 1. was analysed in detail in the context of pedestrian traffic. The estate was chosen due to its location and data availability. The gated community is located in Huby urban unit, in the city centre. The residents have a decent

spatial accessibility to public transport and a wide range of basic or commercial services which favour the abandonment of car traffic in the interest of pedestrian traffic.

The observations of pedestrian mobility were carried out in an essential period for Polish society. It took four weeks, during which the government introduced subsequent restrictions related to the COVID-19 pandemic. Traffic count was used to verify the pedestrian links in gated community, archive and describe the changes related to the mobility of residents within the estate. The observations were performed from October 19, 2020 to November 13, 2020. 30 measurements of people entering and leaving estate were carried out. The study occurred on weekdays, in two time slots: 7:00-9:00 AM and 3:00-6:00 PM. The timeframes of the observations include 3 stages of government restrictions affecting the mobility of residents:

- stage I: 19th – 23rd October 2020; Wrocław is in the yellow zone [cf. 22.]; blended learning of secondary school and university students,
- stage II: 26th October 2020 – 6th November 2020; Wrocław is in the red zone [cf. 22.]; remote learning of primary school (IV-VI classes), secondary school and university students,
- stage III: 9th – 13th November 2020; Wrocław is in the red zone [cf. 22.]; remote learning for all students.

The analysed estate consists of four housing buildings with 537 apartments. There are two entrances marked with letters A and B – as shown in fig. 2. The time of crossing the entrance zones takes 30 seconds¹. The 2 meters safe distance can be kept only on the fire lane by pedestrians. The distance between passing people is several centimetres due to the narrow pavement and single gates in the entrance zones.

¹ Gate A: resident walks along the estate entrance, then passes the single wicket gate and subsequently follows the narrow pavement to the fire lane. Gate B: resident walks along the gateway to underground garage, then passes the wicket gate and crosses the stairs or ramp and subsequently gets to the fire lane.

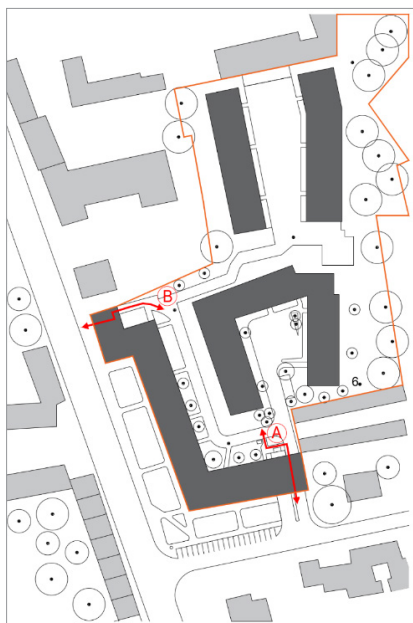


Fig. 2. Site plan of entrance zones in the gated community

Results

The results were formulated in two fields (pedestrian mobility and shaping the entrance zone of gated community) based on the observation of pedestrian traffic. However, identification of the dynamic changes in pedestrian traffic on a local scale in a specific moment of the pandemic are the unique data and an important comparative material for further research.

Decline in pedestrian mobility: In the analysed period, there is an evident decrease in the number of pedestrians in the gated community. The turnout walking on foot gradually decreased both in the morning and afternoon.

Trafficability performance of the gates: The determination of a trafficability performance of a single wicket gate is a crucial outcome of the research. In the analysed case, less than 120 people per hour should pass the gate to do it safely². Importantly, this calculation was not exceeded a single day, albeit that the observations were not conducted in a typical social situation. The number of people passing through a single gate was ranged as follows: afternoon – A: 114-62, B: 113-45, morning: A: 70-31, B: 67-39.

Number of encounters: Pedestrian traffic along gates is not proportional in time proving that the pedestrians meet, pass, and accumulate in gates with different frequency. The percentage of encounters in the gate is a crucial value connected with the reduction of 2 m distance between people. The average number of encounters is as follows:

- afternoon: stage I – 44,4%, stage II – 37,60%, stage III – 28,3%,

- morning: stage I – 20,6%, stage II – 30,6%, stage III – 21,7%.

The decrease in the number of encounters in the afternoon corresponds to a decrease in the total number of pedestrians. There are increases in the number of encounters in the morning during stage II. Thus, the number of pedestrians decreased, and the number of encounters increased. Consequently, the number of people leaving the gated community was cumulative.

Discussion and conclusions

The pilot study confirmed how strongly everyday life of the inhabitants changed in the case of pedestrian mobility in the pandemic period, as well as how many challenges must be taken into consideration by designers. It is necessary to reevaluate pedestrian mobility in the current situation to face future threats. The open space, which allows safe traffic in possible epidemic threats, is important to provide safe meetings and encounters between buildings. Furthermore, the issue of reducing the social distance concerns many places in the city, not only gated communities, e.g. residential tall buildings with many apartments accessible from one gate.

In the light of the conducted analyses, the postulates of shaping the entrance zones could be pointed out:

- the increased number of gates could enable to keep an appropriate distance and avoid an accumulation in the entrance zones. Despite the lower number of encounters than 1 person per 30 seconds, 30% of pedestrians met in the analysed wicket gates. Consequently, there is a need to design more than a single wicket in gated communities,
- avoiding long and narrow footpaths allows pedestrian to pass freely,
- separating zones into entry and exit to minimize contacts between residents in critical moments of pandemic is suggested.

The postulates for further research could be also described:

- repetition of the observation for selected gated community after pandemic period and estimation of pedestrian mobility before pandemic,
- considering the difference in the pedestrian mobility of gated communities located in the city centre and suburbs,
- monitoring pedestrian traffic in housing estates dispersed in Wrocław with different accessibility to public transport and services.

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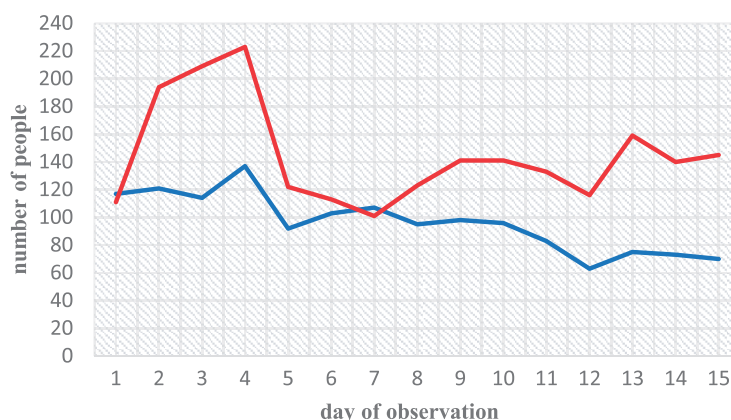


Fig. 3. Dynamics of turnouts passing the entrance zones in afternoons and mornings (aggregated for A and B gates)

² If more than 120 people per hour pass through the gate, they will be forced to keep distance lower than 2 meters from each other. The time of crossing the entrance zones by one person takes 30 seconds. It follows that for one hour, 120 people can safely pass through the entrance zone.

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CORRECT QUOTATION FORMAT

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Abstract: In recent times the risk of SARS-CoV-2 infection remains increased, especially with direct contact or reduced distance to the infected person. This paper outlines the case study of pedestrian mobility in one of the residential estates in Wrocław, Poland. The pedestrian mobility was examined in gated community, which counts several hundred apartments. The entrance to the estate is provided by two wickets. Observations of pedestrian traffic were conducted for four weeks (October–November 2020) when the government introduced restrictions to limit virus transmission. Our research revealed that the limited number of entrances and fencing give the inhabitants sense of security, however it poses a threat in a pandemic period.

Keywords: COVID-19, urban design, ghettozation, urban space, spatial accessibility

Streszczenie: MOBILNOŚĆ PIESZYCH W STREFACH WEJŚCIOWYCH OSIEDLI GRODZONYCH WE WROCŁAWIU W DOBIE PANDEMII COVID-19. Ryzyko zakażenia wirusem SARS-CoV-2 w przestrzeni osiedla jest możliwe, szczególnie w sytuacji zmniejszonego dystansu lub bezpośredniego kontaktu z zainfekowanym. Wyniki badań przedstawiają studium przypadku mobilności pieszej jednego z wrocławskich zespołów mieszkaniowych. Analizie poddany został ruch pieszy mieszkańców grodzzonego osiedla mieszkaniowego liczącego kilkadziesiąt mieszkań, na teren którego prowadzą dwie furtki. Obserwacje ruchu pieszego prowadzono przez cztery tygodnie, w okresie październik–listopad 2020 roku. Był to czas wprowadzania przez rząd restrykcji mających na celu ograniczenie transmisji wirusa. Jak wynika z badań – ograniczona liczba wejść i grodzenie osiedla daje mieszkańcom pozorne poczucie bezpieczeństwa, jednak w czasie pandemii stanowi zagrożenie.

Słowa kluczowe: COVID-19, urbanistyka, ghettozacja, przestrzeń miejska, dostępność przestrzenna

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