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RESIDENTIAL SEGREGATION IN WARSAW AND ITS METROPOLITAN AREA IN THE CONTEXT OF CHANGING HOUSING POLICY

Abstract. Warsaw and its metropolitan area seem an interesting testing ground for research on the phenomenon of residential segregation in the context of the evolution of housing policy, since the city has been subject to significant changes as a result of historical events. Each of these contributed to alterations in the level and the character of residential segregation. The goal of this article is to answer the following question: Was the changing housing policy in Warsaw and the surrounding metropolitan area during the transformation period and afterwards accompanied by a modification of the segregation structure and what differences can be noticed in the whole of the metropolitan area and in the city itself?

Keywords: housing policy, residential segregation, spatial segregation, Warsaw Metropolitan Area.

1. INTRODUCTION

Residential segregation has become an intrinsic feature of contemporary cities and their metropolitan areas, while housing policy has become a tool that can be used to modify the phenomenon and to level the disadvantageous social and spatial processes involved therein. Views concerning the need for and scale of interventions of authorities under their housing policy are the source of much controversy. Supporters of the market liberalisation find the market as the best mechanism regulating the housing situation, whereas state interventionism advocates list

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numerous examples of how the lack of such measures brings about unfavourable social effects. In most European states, also in Poland, authorities assume a partial interference in housing-related matters. The range of interventions is extremely diversified and depends on a multitude of factors, of an economic, demographic or even ideological nature. Poland seems a very interesting testing ground for research on the phenomenon of residential segregation in the context of the evolution of housing policy. Housing policy has been subject to substantial changes shaped by historical events.

The goal of this paper is to respond to the following question: Was the changing housing policy in Warsaw and the surrounding metropolitan area during the transformation period and afterwards accompanied by a change in the segregation structure and what differences can be observed in the whole metropolitan area and in the city itself?

2. RESEARCH METHODOLOGY

The two most frequently identified approaches to research on segregation assume that: (1) segregation is treated as a pattern that denotes the level to which people belonging to various social groups live separately; (2) segregation is recognised as a process that showcases how spatial inequalities alter (Johnston *et al.*, 2009). As Marcińczak *et al.* (2011) stated we can find a considerable amount of academic papers referring to changes in social segregation processes, but there are fewer studies focusing on the pattern. Multidimensional analyses of segregation are applied even less often (Jaczewska and Grzegorzczak, 2016). The shortage of such studies applies also to Warsaw and its metropolitan area. In this paper it was attempted to combine research results on the processes changing the positioning of spatial inequalities resulting from the housing policy with the results of research on the segregation pattern, applying multidimensional segregation indices.

Research on the residential property market in Poland focuses primarily on changes during the transformation period and present-day alterations. Among the many papers on this subject are: a typology of housing developments according to social features by Smętkowski (2009), publications referring to changes in deployment of housing resources in Warsaw (Stępnia, 2014) and studies combining issues of socio-spatial diversity with spatial planning and housing policy (Górczyńska, 2014; Polanska, 2014). The second stream of research pertains to the relation between the housing market and the state, as well as to the so-called housing cycle (Lis, 2008, 2012). There are also numerous studies referring to the housing situation in Poland, carried out both under national and international research projects (Salamon and Muzioł-Węclawowicz, 2015; ESPON 2013). In

most of these accounts, the authors underscore the permanent shortage of flats and constraints that limit access for the poor to housing, as well as a lack of long-term plans that would counteract social exclusion.

Research on segregation (social segregation in particular) in Warsaw has a long-standing tradition, documented by numerous publications. A large part thereof is dedicated to changes that occurred before and after the transformation, and those that are taking place in the present day (Węclawowicz, 1979, 1998, 2004, 2008; Jałowicki *et al.*, 2003; *Atlas Warszawy* 2009), sometimes referring to the analysis of socio-spatial changes in Warsaw as compared to other post-socialist cities (Marciniak, 2013). These studies highlight growing social inequalities, but also the stability of the historically conditioned socio-spatial pattern. Researchers examining social and spatial diversity in Warsaw mainly focus on one social feature, whereas multidimensional studies (as those represented by Smętkowski (2009) or in *Atlas Warszawy* (2009)) are much less popular.

The phenomenon of segregation was examined for several population categories (according to age, number of members of independent households, education and various social welfare benefits). Census data from 1988 and 2002 were taken into consideration (these are the last censuses for which analysis can be carried out at the commune or district level). Analyses of social and occupational segregation of Warsaw inhabitants were also referred to, although it was impossible to carry out a dynamic analysis for them. The most recent data from 2014 that are less credible and refer only to age, social benefits and registered unemployment were taken into consideration in this study on account of the lack of other possibility to trace contemporary changes based on census data.

The phenomenon of segregation was analysed for two area levels: the Warsaw Metropolitan Area¹ (WMA), divided into communes and including the city of Warsaw, and the city, divided into districts.

The phenomenon of segregation was explored taking into account a multitude of calculated segregation indices selected on the basis of a broad overview of research literature on segregation measures (Grzegorzczak and Jaczewska, 2015). The multitude of segregation measures can be classified using chronological criteria into 3 generations of indices. The first generation measures,² which are the most commonly used, have three major limitations – they are aspatial, global and show only two-group segregation. Hence, second-generation measures were developed to meet the last limitation and allow the multiple group analyses (Feitosa

¹ The metropolitan area boundaries adopted herein comply with the guidelines of the Regional Development Ministry and the Mazowieckie Biuro Planowania Regionalnego (Mazovian Regional Planning Bureau), as determined in the document *Delimitacja Obszaru Metropolitalnego Warszawy* (Delimitation of the Warsaw Metropolitan Area).

² First generation measures: the dissimilarity index D (Duncan and Duncan, 1955), the interaction index P (Bell, 1954), the Gini index (Cowell 1977), the information theory index (Bell, 1954) and the Atkinson index (Atkinson, 1970).

et al., 2004).³ The third generation measures meet the aspatial limitation of the previous ones i.e. the checkerboard problem (White, 2011).⁴

In line with Massey and Denton (1988), a multidimensional approach has been applied in the article to examine: the dissimilarity index D (dimension of inequality), the P_x isolation index (dimension of exposition), the DEL delta index (dimension of concentration), the ACE absolute centralization index (dimension of centralization) and the SP spatial proximity index (dimension of clustering) (Appendix 1). This approach was chosen as social segregation is not an explicit concept as the population inhabiting a given area may be 'segregated' in various ways. The measures used were mainly first and third generation measures. Cartograms were developed on the basis of the calculated LQ_p (modified location quotient).⁵ They were drawn up using data for which LQ_p and SP values (these two measures represent the spatial dimension of the phenomenon) were the highest and for which changes that occurred in 1988 and 2002 were most pronounced.

A research approach assuming an analysis of the historical and institutional contexts with reference to the residential segregation process was suggested by Maloutas and Fujita (2012). The elements that affect residential segregation include: (1) economics, i.e. the labour market and access to housing; (2) state politics – involving the redistribution of flats and public services as well as local legal regulations; (3) social aspects, taking into account the local relations network and (4) specific and permanent socio-spatial structures of cities. In this article we attempt to stay focused on the housing policy which can be assigned to the first two of the four mentioned factors conditioning segregation.

3. CHANGING HOUSING POLICY IN POLAND AND ITS INFLUENCE ON WARSAW RESIDENTIAL PATTERN

Current housing situation and the residential segregation pattern in Warsaw and its suburbs can be understood only by taking into account the historical context and by highlighting the three crucial periods that affected the city: the time after the Second World War, the development of socialist housing policy and the period of political transformation.

³ Second generation measures mostly constitute generalised versions of prior indices, e.g. dissimilarity index D , interaction index P , or relative concentration index RCO .

⁴ Some third generation measures also refer to modifiable areal unit problem (MAUP) that has spatial nature, too. The special indices most commonly quoted in literature have been gathered by Reardon and O'Sullivan (2004).

⁵ LQ_p is frequently applied, but does not fit under the suggested division of measures as this is a typically geographical factor, which provides the foundation for cartograms (Węclawowicz, 1992).

Warsaw was to a great extent destroyed during the Second World War, and this brought new needs and priorities in the development of housing construction. The lack of flats forced authorities to take measures towards a fast reconstruction and a more effective use of the salvaged housing resources. The biggest changes occurred in the capital city. Following the so-called Bierut Decree (*Decree on ownership and usufruct of land in Warsaw* issued on 26 October 1945 by the State National Council) the local government of Warsaw became proprietor of all land located within the pre-war boundaries of the city.⁶ The second crucial decision was the freezing of the rents, which was supposed to prevent speculations on the housing market. The fixed rents were below the real market value of maintenance costs for a pre-war building, which resulted in the gradual dilapidation of dwellings that had survived the war or had been rebuilt shortly after. After the downfall of the socialist People's Republic of Poland (PRL), the Bierut Decree remained in force. Nowadays the lack of clearly defined ownership rights often hinders the repair work of dilapidated houses. Moreover, the takeover, by heirs, of buildings which hitherto constituted the city's municipal housing resources creates new problems, as does the reprivatisation which further depletes the city's housing resources.

The post-war reconstruction of the destroyed city fabric was quite successful, in particular in central areas, where technical infrastructure had already existed (Stępnia, 2008). In 1951 the government decreed urban development standards outlining among others the trend towards compact urban development, the division into construction blocks, the rigid concept of the building height in the city and the accumulation of buildings (Zaniewska *et al.*, 2008), which shaped the spatial pattern of the city centre. These statutory norms also became a tool to determine the egalitarian templates of the housing standard which resulted in a bigger social diversification of the housing resources at that point.

The 1950s mark the launch of the industrialisation plan for Poland and the beginning of the transformation towards a socialist housing economy. The housing policy was characterised by centralised decision-making and was financed almost exclusively through the state funds (Andrzejewski, 1987). New housing construction technologies contributed to development of a large number of new estates in Warsaw and its suburbs. Decision makers, to lower the costs of construction, tended to use already improved land. The quality and the layout of the estate or the flats themselves worsened (e.g. windowless kitchens). The builders also applied

⁶ The *Decree* was designed to support the reconstruction of the capital. In line with the assumptions to the act, salvaged buildings were to remain the property of its former owners. Unfortunately the expropriation of house owners became common practice for authorities. Landlords were forced to turn dwellings into municipal flats and to take in lodgers allocated by the local authorities (this happened in particular in centrally-located districts where land was extremely valuable, such as Śródmieście, Mokotów, Ochota).

a repetitive and monotonous architectural style. Until the 1970s, housing construction was concentrated in the central part of the city; in the 1970s construction started on the outskirts.

At the beginning of the 1970s the industry saw large-scale application of the panel building technology for housing construction (so-called housing boom was visible). Huge residential complexes, usually in the form of clusters of high rises erected in the panel building technology, were located in city peripheries. Thanks to increasing the height of residential buildings, city planners managed to ensure the maximal use of land for housing purposes (Molski, 1988). New development started taking the form of well-planned districts, although quite frequently housing investments were not followed by infrastructure investments in the surrounding area. This led to the creation of monofunctional areas which until this day are functioning as 'Warsaw bedroom districts'.

In the Warsaw Metropolitan Area residential developments were usually not as big in size and were often closely tied to the location of industrial plants, to ensure housing to labourers. Even smaller towns saw the erection of block of flat estates that were not related to traditional spatial patterns. The panel-built estates, which were often tied to large production plants, faced bigger dilapidation during the transformation and after the collapse of industry (sometimes these areas turned into enclaves of poverty).

The 1980s were a time of deep economic crisis, which affected negatively the residential construction sector. The number of completed flats fell drastically, though the decreased number of units did not affect the location preferences on the outskirts of the city. In Warsaw, Ursynów attracted the biggest housing complexes of the time, encompassing over 22,000 flats (Stępiak, 2008).

The political and economic system transformation in Poland brought about considerable changes in the housing policy. The most important among these was the transfer of tasks related to fulfilling housing needs to local administration units, i.e. local governments established in 1990 (and thus the resignation from a centrally planned policy). This way local governments became responsible for new municipal housing and for the maintenance and refurbishing of existing buildings which had been de-capitalised due to long-term neglect. What was equally important was the withdrawal from financing of state-owned building companies and housing cooperatives. Budget spending on housing shrivelled slowly, thus limiting also the level of state intervention into the market. Starting from the 1990s, funds were mainly used to settle commitments from the previous era. The investment undertaken by private investors became a fundamental modifier of the existing spatial structure. The huge increase in land prices caused the maximal use of building plots. Flats no longer had the status of a social good, but actually became a commodity (Marszał, 1999). As the significance of housing cooperatives as chief property development investor was diminishing in favour of the private sector, including real estate developers, the commoditization of flats advanced further.

As a result of limiting the budget spending, social housing visibly regressed. The poor technical state of municipal houses and the lack of funds for maintenance caused a large part of these resources to be sold at underestimated prices. These low prices were obviously appealing to the tenants residing in them, which is why they often decided to buy out the flats and become their legal owners, and thus the number of poor flat owners soared. The sale of municipal flats and the lack of new investments resulted in a decrease in housing resources available to local authorities.

To answer the needs of the middle class, which did not meet income requirements to apply for state aid or a municipal flat, but which also lacked own funds to purchase an apartment), in 1995 the state created *TBS* (the social housing associations), modelled after the French HLM, or public housing. This plan, though commendable, was not commonly used.⁷ At present, the idea is being revived in official plans, although not without certain modifications. The notion of returning to *TBS* building seems important from the city development point of view, which is connected with the constant influx of new inhabitants.

As a result of the decline in the number of new flats built in the 1990s and at the beginning of this century, authorities decided to introduce tax reliefs as a model of directly subsidising households. What was introduced were new home saving forms, such as with building societies and using contractual loans – both instruments were offered mostly to richer social groups. The assumptions to the housing policy for 1999–2003 suggested establishing preferential loans for the purchase of a flat or own house, as well as a subsidy to cover interest of bank loans for renovations. In 2006 an act on supporting families in acquiring their own flats introduced a housing subsidy programme titled ‘Rodzina na swoim’ (Family Living on its Own): for people living alone or families with children applying for a home-buying loan, the state-funded programme stipulated a reduction of the capital interest rate.⁸ The programme ended in 2012, but a follow-up scheme titled ‘Mieszkania dla Młodych’ (Flats for the Young) was launched in 2014. The popularity of the programme is evidenced by the fact that already in April 2017 the number of applications for subsidies to own contribution exceeded the limit of funds earmarked for the whole year. In 2016 a new national program ‘Mieszkanie Plus’ (Flat Plus) was officially proposed and it seems very promising, unfortunately details of its implementation are still unknown.

⁷ According to Zaniewska (2005), what severely hampered attempts to secure a unit in *TBS* buildings were the qualifying criteria. Flats did not turn out as cheap as it had been assumed; moreover, at the beginning it was impossible for households residing in *TBS* buildings to buy the units, which led to the distortion of the whole system.

⁸ However, the programme also listed a range of restrictions, concerning the floor area and price per square metre, which in case of Warsaw significantly limited access to flats.

Another tool that contributed to the improvement of housing conditions and counteracted the progressing dilapidation of existing buildings was the fund for thermal upgrading of buildings – it took on the form of subsidies for investors carrying out thermal upgrade projects who took out loans in commercial banks for that purpose; the investors could then apply for a so-called thermal upgrade bonus, awarded by the state-managed bank (BGK). These actions were above all supposed to lower the energy consumption thanks to modernising the heating systems in homes but also enabled renovations. It was advantageous, since it was addressed to a wide group of beneficiaries (Gzell, 2002). The fund allowed to considerably enhance the look of many of neglected large-panel system buildings and increase the attractiveness of living in such buildings. In some places investors also redeveloped the landscape of housing estates, thus greatly amending the aesthetics (e.g. in Ursynów).

Housing benefits have remained a direct form of support for the poorest households since the mid-90s. These allowances are to cover part of the maintenance costs. Since 2004, it was local governments that have been burdened with expenditures on housing benefits, which resulted in even greater restrictions on obtaining aid. Municipal funds are currently insufficient to cover the needs of inhabitants, which means that only a small percentage of households can count on support. The soaring costs of using and buying flats inflate both the scale of exclusion in terms of housing, as well as social stratification (Zaniewska, 2005).

Since the 1990s until this day, most housing investments have been situated on the outskirts of cities. It is worth noting though that investments undertaken since the 90s differ much from those carried out until the end of the 80s. The size of the developed estates was reduced. It was the result of restrictions imposed on the size of investment land and of economic (such as the investment being financed mostly by private entities) and legal factors (issues of fragmentation or of unsettled ownership rights for various tracts of land). The deployment of housing resources was uneven and dispersed. Since the 90s most of investments were directed to middle-class or upper-class citizens (Jałowicki *et al.*, 2003). This caused a surge in the construction of higher-standard flats responding to extremely diverse needs. In places of new investments developers create areas that are homogeneous in terms of social structure, which constitutes a new element compared to the mosaic layout encountered on estates built earlier. These new estates are often enclaves of wealth, definitely standing out against the surrounding, whereas particular estates and even separate buildings are gated (Jaczewska, 2014).

4. MULTIDIMENSIONAL SEGREGATION ANALYSIS IN WARSAW METROPOLITAN AREA

A comparison of segregation indices for the Warsaw Metropolitan Area for the years 1988–2002 can be conducted for the following categories: age of inhabitants, number of members of households, education level. Between 1988 and 2002 a rise of segregation indices (D , P , DEL , ACE) was noted for elderly inhabitants and smaller households (one- or two-person households), as well as for the population with vocational training only (no DEL) (Appendix 2). The top values were achieved for indicator D for the biggest households in the years 1988 and 2002 and for those with the highest education in 1988. Even though these groups maintained their high position over the next years, the top rank started to be claimed by people with the poorest education. However, with respect to the indicators DEL and ACE , it was the people with the best education who continuously remained most separated from other population groups, which is related to the dominating position of Warsaw within the metropolitan area. University graduates continue to be centred in Warsaw. High values of DEL and ACE indicators can be noted also for one-person households; in the investigated period, the indicators rose continuously, proving the focusing role of Warsaw. Drops observed were insignificant; they concerned above all the indicator D for all age groups (save for over-sixty-year olds), D for all education levels and the value of DEL for education groups and P for average-sized households; the latter's drop was the most prominent among all the other index falls (Appendix 2).

To examine the spatial differentiation, we selected, for the cartographic analysis, data of over-sixty-year olds, people with university education and receiving social benefits. Data concerning age, the size and ownership of housing have been aligned on maps. What is noteworthy is that the coincidence between the location of the elderly and the age of flats in the metropolitan area is not visible (Fig. 1). The oldest residential resources are located outside of Warsaw in counties situated along the railway line running to the southwest. Most of the flats from the construction boom in the 70s are located in communes located close to Warsaw and which have also seen industrial investments (i.a. Legionowo, Wołomin, Otwock). The latest buildings built between 1988 and 2002 were situated in counties surrounding Warsaw, including Piaseczno, Żąbki, Łomianki. There is also no correlation between the size of flats and education, whereas the correlation between households with over 5 members and the size of flats is discernible (Fig. 2). The biggest flats, of over 80 m², can be found in counties surrounding Warsaw, in particular in towns boasting newer investments (Piaseczno, Wołomin, Łomianki, Wyszaków, Raszyn, Konstancin, Jeziorna, Sulejówek, Józefów), where the construction of detached houses was advancing. There is a very slight correlation between a high LQ_p for people receiving social benefits, and the form of ownership

(Fig. 3). Private ownership dominates in the whole metropolitan area, whereas higher rates of housing co-operative flats turn up in commune centres, such as Legionowo, Wyszaków, Wołomin, Mińsk Mazowiecki, where small blocks of flats were built in the 1970s and 1980s.

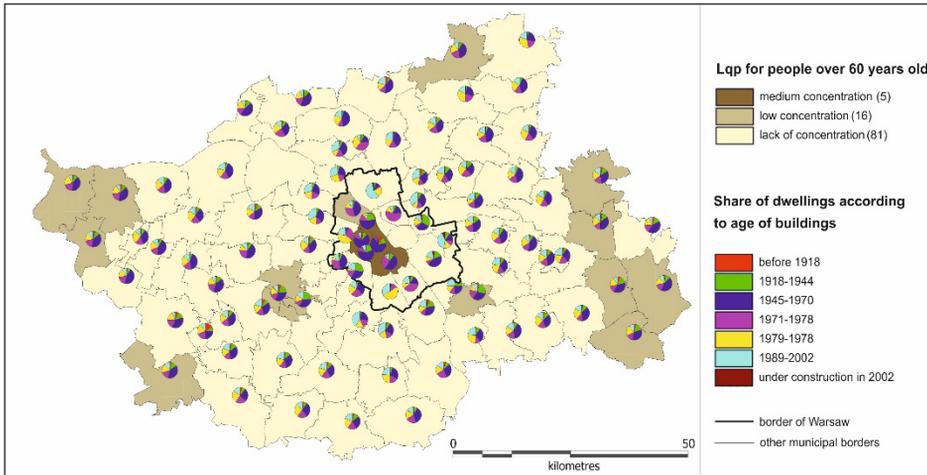


Fig. 1. Localisation of the elderly people and share of dwellings according to age of buildings in Warsaw and its Metropolitan Area in 2002

Source: authors' elaboration

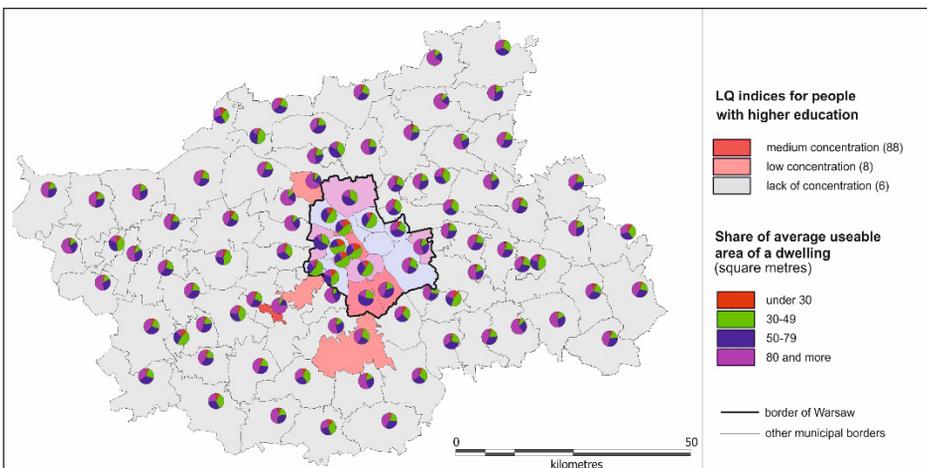


Fig. 2. Localisation of people with higher education and share of average useable area of a dwelling in Warsaw and its Metropolitan Area in 2002

Source: authors' elaboration

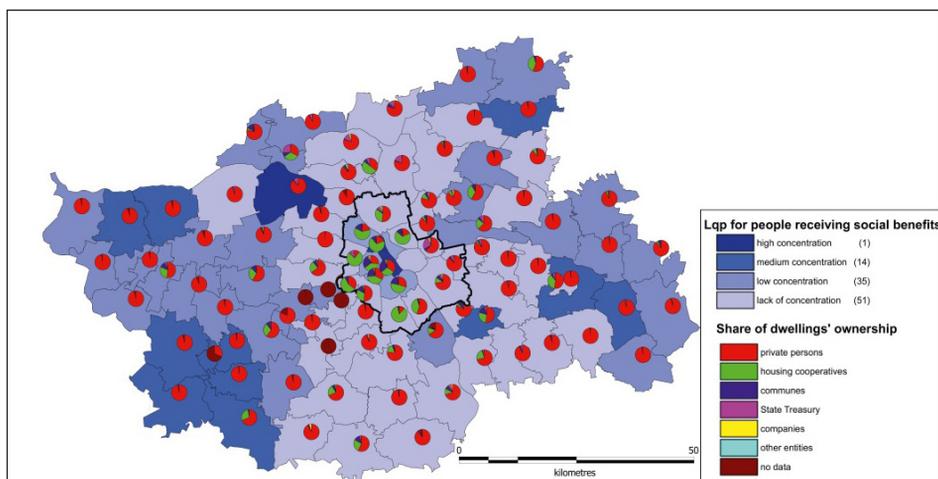


Fig. 3. Localisation of people receiving social benefits and share of dwelling ownership in Warsaw and its Metropolitan Area in 2002

Source: authors' elaboration

In 2002 the problem of segregation in the Warsaw Metropolitan Area concerned above all people with vocational or unfinished primary school education, and to a lesser extent the biggest households as well as people with higher education. In Warsaw the clear concentration of elderly inhabitants and people with higher education is visible (Jaczevska and Grzegorzcyk, 2016).

A comparison of the level of segregation for the years 2002–2014 is possible only on the basis of data for age groups and the level of unemployment. It is impossible to determine any kind of characteristic trend whatsoever for age groups. When measured by indicator *D*, the segregation of the jobless increased, whereas measured with other indicators decreased. This may indicate that the problem of lack of job opportunities affects mostly areas outside of Warsaw (Appendix 2). However the segregation indices were very low over the whole research period, indicating that unemployment could affect various population groups.

5. MULTIDIMENSIONAL SEGREGATION ANALYSIS IN WARSAW

A comparison of segregation indices in Warsaw for the years 1988–2002 was carried out on the basis of the following data: age groups, number of members of independent households and education degree. The increase of demographic

segregation in terms of indicators *ACE* and *SP* was evident, which is related to the stronger demographic coherence of areas – in particular those closer to the centre – where the concentration of elderly inhabitants was biggest (Appendix 2). Similarly, indicators *D* and *P* rose for the smallest and the biggest households for which indicator *D* was highest compared to all the other analysed groups. The smallest households are clustered in central districts of Warsaw, whereas the biggest ones tend to be on the city outskirts, mostly in peripheral districts Wawer and Wesoła, with the highest number of affordable investments, available to families under programmes such as MDM. However, *DEL* and *P* indicators for children and bigger households fell, which may account for the spreading of families also to other city areas. Even though, measured by indicator *D*, the level of segregation of elderly dropped, it is still one of the highest among all age groups. Social segregation, measured by way of education degrees, increased for all indicators, apart from *DEL*. In Warsaw there are more socially homogenous districts that combine into bigger areas with similar social characteristics. Apart from indicator *P*, all indicator values are still lower than those delineating demographic segregation, whereas the highest segregation level is recorded more often for population groups with secondary or vocational education.

When analysing the spatial distribution in Warsaw, one may notice a coincidence between the location of people aged above 60 and the age of buildings (Fig. 1), between the education degree and the size of flats (Fig. 2) and between the receipt of social benefits and the type of ownership (Fig. 3). People reaching their pension age are clustered in the city centre, where pre-war buildings prevail, whereas the newest residential buildings are concentrated on the outskirts of the city. People with university education prefer living in bigger flats which usually they own or which are co-operative apartments. People receiving social welfare generally live in municipal flats or in co-operative flats, most of which are located in central districts of the city.

A broader static research, taking into consideration a wider number of statistical data and carried out for 2002, showed a higher level of segregation for people with the lowest occupational status, for households with the biggest number of members and for elderly inhabitants, to a lesser extent also for people with vocational education (Jaczewska and Grzegorzczak, 2016). Central districts show the biggest incidence of elderly inhabitants, living in one-person households and people living off welfare.

An analysis of the level of segregation according to age and social welfare recipients was possible for the years 2002–2014. It is difficult to spot a characteristic trend regarding the fluctuation of age-related segregation indices, although the changes observed are akin to trends noticed for the whole metropolitan area. The segregation of people receiving social benefits increased in terms of indicator *D* and dropped with regard to other indicators. Changes are similar

for the level of segregation of the unemployed, though it is not as prominent. Just like in the WMA, Warsaw, too, sees a growing concentration of people living off social welfare in certain areas, though these are usually city outskirts. This is most likely related to the beginning of the gentrification process in the city. It may be happening only in selected locations, but it happens nonetheless in central districts of the city.

6. DISCUSSION AND CONCLUSIONS

The aim of the presented article was to answer the question whether the changing housing policy in Warsaw and the surrounding metropolitan area during the transformation period and afterwards was accompanied by a change in the segregation structure and what differences can be observed in the whole of the metropolitan area and in the city itself.

We have noticed the conversion of the segregation pattern for Warsaw and its metropolitan area, accompanied by a changing housing policy during the transformation period and later on, even though due to statistical data limitations this analysis is certainly incomplete. In Fig. 4 the categories that indicated the highest values of segregation indices (based on the dissimilarity index D) were presented. Segregation increased in the WMA for most indicators pertaining to the elder population, smaller households (of one to two members) and residents with university education. Smaller households and people with university degrees are increasingly concentrated in Warsaw itself. The city is witnessing a rise in demographic segregation (age, the smallest and the biggest households), as well as social segregation measured by way of education, even if only for a small number of the indices.

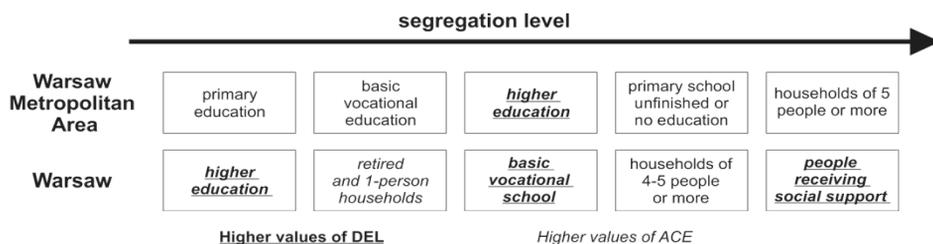


Fig. 4. Categories that indicated the highest values of segregation indices in Warsaw Metropolitan Area and the city

Source: authors' elaboration

In Tab. 1 most significant (according to authors) features of housing policy in Poland until and since 1989 and their consequences for the contemporary residential pattern are presented. The current process of increasing segregation of certain population categories seems to be tied to changes that occurred in housing policy that supports the contextual nature of the segregation process (Maloutas and Fujita, 2012). However, it has to be stated that housing policy only to a limited extent influenced the residential pattern and was not the only force that created contemporary socio-spatial differences. The continuously huge significance of demographic segregation on the scale of the city and of the metropolitan area is related to the low mobility of older people and to the impact of the socialist era housing policy. The rising segregation of people with a low status is related to neglect of the housing policy in terms of municipal buildings (firming shortage that recently slowed down and concentrated location). However, the dominant activity of developers on the residential market contributes to the establishment of enclaves of wealth (segregation on a microscale), through spread across the whole city, since flats built for sale are available chiefly to people of a higher social status.

Table 1. Specific features of housing policy until and since 1989 and their impact on residential pattern

Housing policy until 1989	Housing policy since 1989
Change in ownership	
state ownership	private ownership
Expropriation of some owners → unsolved problem of re-privatization Fixed rents, which were not sufficient to repair existing buildings → a significant degradation Lack of modernisation and investment in existing buildings (including the pre-war ones) → a significant degradation	Withdrawal of the state from direct construction projects to private entities → domination of private investments for sale Transfer of housing policy to the level of municipalities → municipalities responsible for maintenance and investments → lack of funds Small scale interventions → high stability of problematic areas (enclaves of poverty) Lack of new municipal investments and selling out of municipal housing → shortage of affordable housing Formation of enclaves of wealth associated with new investments Significance of ownership rights, domination of private owned dwellings → still small residential mobility

Housing policy until 1989	Housing policy since 1989
Profit	
profit as not important motive for new investment	profit as significant motive for investment
<p>Investments did not take into account the cost of ground rent and transportation, new investments located on periphery areas at a considerable distance from the centre → large scale of commuting to work</p> <p>Spatial continuity of the city was interrupted → compact construction in the centre and less intensive on periphery areas excluding the space in between.</p> <p>Apartments were a social good and not a commodity → low residential mobility</p> <p>Diverse socio-occupational structure of neighbourhoods → “social mosaic” visible today in older neighbourhoods</p>	<p>Ground rent restored → a significant increase in land prices</p> <p>Investments take into account the costs of ground rent → potential income from investments is maximised by private investors</p> <p>Construction on free plots in the city centre, but the biggest investments still in periphery areas → large scale of commuting to work</p> <p>Domination of building investments focused on the richer part of society → creation of new homogenous areas in terms of social status</p> <p>Domination of investments for sale, lack of investment in housing for rent</p>
Residential property market	
Planned top-down	‘Spontaneous’, small scale
<p>Realisation of the largest in the history housing projects → significant increase in number of dwellings until the 1980s</p> <p>Investments were carried out by lowering the norms and standards of housing → high housing density, small flats, low standard</p> <p>Significant investments in large panel technology → problem with modernization</p> <p>Creation of monofunctional areas and delay in the location of services associated with housing → lasted until the 1990s</p> <p>Needs of residents were not satisfied → entering the period of transition with shortage of housing</p>	<p>Spontaneity in the 1990s contributed to large spatial chaos in some neighbourhoods e.g. Kabaty</p> <p>Beginning of the 21st century return to spatial planning of housing estates, e.g. Wilanów</p> <p>Housing market situation, availability of land, demand for new houses as the most important factors of new investments</p> <p>Investments targeted at the middle and upper class → homogenous socio-occupational structure of neighbourhoods</p> <p>Small scale of investments toward disadvantaged social groups → increase in residential segregation</p> <p>High cost of buying an apartment in the city → process of urban sprawl</p>

Source: authors' elaboration.

The context-specific and path-dependent characteristics of cities create a need for a regional summarise. The relationship between residential segregation process and housing policy is treated in a historic perspective in the research concerning Central European countries i.e. post socialist countries. There are underlined segregation origins in bourgeois city and their continuation in the communist period when nomenclature members lived in former noble estates (Kovacs, 2012).

This is true not only in Budapest but also in Warsaw. Additionally, on the one hand an egalitarian character of the socialist housing policy (in an access and supply dimension) but on the other hand its neglect is revealed, even though the policy was different in particular socialist countries due to *inter alia* a different role of private sector or degree of land nationalisation (Sailer-Fliege, 1999; Sýkora, 1999; Tsenkova and Polanska, 2014; Tammaru *et al.*, 2016). However, it should be stated that the neglect of municipal housing did not start in the communist time (Kovacs, 2012) therefore residential segregation of the lowest social classes is a permanent situation. In Poland the shortage of municipal housing may be more severe due to war damages (Tsenkova and Budic-Nedovic, 2001). In the aftermath of the socialist housing policy the socialist city had an egalitarian character however socialist cities were segregated to some degree and segregation processes dynamics changed during the period (Sailer-Fliege, 1999; Sýkora, 1999; Węclawowicz, 1992). The changes in housing policy in the transformation period, that is its commercialisation (changes have also their specificity in particular post socialist countries in terms of *inter alia* the role of rehabilitation programmes, restitution solutions and conditions of large housing estates of the communist period), are supposed to increase social polarisation and residential segregation especially in microscale (Górczyńska, 2014; Kovacs, 2012; Sýkora, 1999; Sailer-Fliege, 1999). However, it is not evident for all population categories nor for all dimensions of segregation as we proved it in the article. Here our research is analogous with the results of Marcińczak *et al.* (2011) who underlines temporal smoothing effect on segregation level of suburbanization, gentrification and stability of panel block estates by expansion of higher status areas (also confirmed by Kovacs, 2012). The differences in segregation between Central European countries may be connected also with different degree of urban sprawl in particular countries. However, the segregation indices still remain rather low, which is confirmed by all researches mentioned.

The socio-spatial pattern of Warsaw is addressed rarely in the literature. Our research confirms the current concentric demographic distribution in the city (connected to low mobility of the elderly) and sectoral distribution of the higher status population along the NS axis (highly educated in our research) (Smętkowski, 2009; Marcińczak *et al.*, 2011). The distribution of the lower status groups (lack of education and receiving social support in our research) in enclaves is probably present at local scale but our research on the district level reveals rather their concentric distribution in the city expanding into the eastern sector. We did not confirm leaning of the lowest classes towards heterogeneous neighbourhoods (Marcińczak *et al.*, 2011) but rather their increasing separation at district level and their low mobility. What we proved is an increase in a peripheral distribution of the elderly and a focalisation of the younger households in the suburban communes. The sectoral distribution of the higher status indicates a continuation of the city pattern in the metropolitan area (hence centrifugal movement of higher

and middle class is confirmed (Marciniczak *et al.*, 2011; Kovacs, 2012), however, the city dominance is immense. At last the lowest social groups are much more dispersed in the metropolitan area, especially at its fringes, and create enclave-like distribution. Hence although socialist city mosaic can be still noticed as a durable pattern, the socio-spatial characteristic of Western cities overlaps on the former socialist pattern on the district scale.

Due to the visible connection of housing policy and socio-spatial differentiation (including residential segregation) and the emerging negative trends (in particular the advancing segregation of people of a low social status), what Warsaw needs (and supposedly cities in other Central European states) is reinforcement of local authorities with housing and spatial development policy tools. In this context, what constitutes the chief challenges for the housing policy in terms of residential segregation is: ensuring a varied, socially aware construction sector (for diverse social categories) in districts of differing social character, and thus the implementation of regulations on the social diversification of districts, housing estates and their parts. The spatial planning policy ought to regulate, to a bigger extent, issues pertaining to spatial coherence, since unfavourable urban layouts serve to reinforce spatial isolation and thus intensify residential segregation.

It is worth mentioning that the multidimensional approach to segregation made it possible to identify demographic and social categories segregated at different intensifications and in different ways. Despite its limitations mentioned in the chapter on research methodology, its use was appropriate also in view of limited statistical data availability in Poland. Still, it is evident in the city that demographically and socially homogenous areas are emerging, also at the level of districts. It is recommended that studies for smaller census units and those using survey data (which are not so time- and space-limited as census ones, especially in Poland) should be applied in the analysis of the segregation process.

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7. APPENDICES

Appendix 1. Formulas used in this article

1. Dissimilarity index (D)

$$D = \frac{1}{2} \sum_{i=1}^n \left| \frac{x_i}{X} - \frac{y_i}{Y} \right|$$

$$D \in \langle 0, 1 \rangle$$

where:

x_i and y_i – number of members in the analysed groups in i -area unit;
 X and Y – the groups' population size in the whole city subdivided into n -area units.

2. Isolation index (${}_x P_x$)

$${}_x P_x = \sum_{i=1}^n \left(\frac{x_i}{X} \cdot \frac{x_i}{t_i} \right)$$

$$P \in \langle 0, 1 \rangle$$

where:

t_i – total population in i -area unit.

3. Delta index (DEL)

$$DEL = \frac{1}{2} \sum_{i=1}^n \left(\frac{x_i}{X} \cdot \frac{\alpha_i}{A} \right)$$

$$DEL \in \langle 0, 1 \rangle$$

where:

a_i – land area of i area unit;
 A – total land area in the city.

4. Absolute centralization index (ACE)

$$ACE = \left[\sum_{i=1}^n X_{i-1} \cdot A_i \right] - \left[\sum_{i=1}^n X_i \cdot A_{i-1} \right]$$

$$ACE \in \langle -1, 1 \rangle$$

where:

X_i and Y_i – respective cumulative proportions of X 's and Y 's population in tract.

5. Spatial proximity index (SP)

$$P_{xx} = \sum_{i=1}^n \sum_{j=1}^n \frac{x_i x_j c_{ij}}{X^2} P_{xy} = \sum_{i=1}^n \sum_{j=1}^n \frac{x_i y_j c_{ij}}{XY} SP = \frac{XP_{xx} + YP_{yy}}{TP_{tt}}$$

$$SP > 0$$

where:

x_i – population in i area unit;

x_j – population in j area unit;

c_{ij} – distance function between areas;

P_{xx} – average proximity between group X members;

P_{xy} – average proximity between members of X and Y ;

P_{yy} – average proximity between group Y members;

P_{tt} – average proximity among all members of the population.

6. Modified location index LQ_p

$$LQ_p = \frac{{}_k x_i / y'_i}{{}_k X / Y'}$$

$$LQ_p > 0$$

where:

${}_k x_i$ – population in k group and in i area unit;

y'_i – population in i area unit decreased by k group population,

${}_k X$ – population in k group in the whole city,

Y' – city population decreased by k group population in the city.

Appendix 2. Segregation indices in WMA and Warsaw (1988, 2002)

2.1. Segregation indices in WMA

Indicators	Unevenness (D)	Exposure (P_a)	Concentration (DEL)	Centralization (ACE)
1988				
Age				
0–9	0.063	0.144	0.616	0.098
10–19	0.050	0.135	0.627	0.125
20–29	0.033	0.129	0.631	0.163
30–39	0.021	0.185	0.667	0.238
40–49	0.040	0.124	0.683	0.274
50–59	0.053	0.123	0.681	0.312
Over 60 years	0.050	0.171	0.654	0.288
No. of members of households in independent flats				
1-person	0.072	0.244	0.731	0.410
2-person	0.046	0.259	0.709	0.377
3-4-person	0.021	0.416	0.681	0.259
More than 5 people	0.250	0.131	0.495	-0.125
Education				
Higher education	0.230	0.179	0.824	0.766
Secondary school	0.094	0.394	0.750	0.609
Basic vocational school	0.142	0.195	0.583	0.351
Primary school	0.141	0.339	0.564	0.356
2002				
Age				
0–14	0.098	0.152	0.556	0.560
15–29	0.009	0.236	0.625	0.640
30–44	0.024	0.198	0.613	0.632
45–59	0.035	0.217	0.649	0.669
Over 60	0.066	0.196	0.657	0.682
No. of members of families and of independent households in flats				
Family with one child	0.060	0.555	0.588	0.669
With two children	0.035	0.360	0.510	0.592
With three children or more	0.214	0.128	0.381	0.397

Indicators	Unevenness (D)	Exposure (P_a)	Concentration (DEL)	Centralization (ACE)
1 person	0.100	0.276	0.735	0.753
2 people	0.048	0.262	0.702	0.724
3 people	0.020	0.208	0.677	0.694
4 people	0.097	0.180	0.616	0.626
5 people or more	0.262	0.117	0.472	0.465
Education				
Higher education	0.186	0.776	0.754	0.821
Post-secondary school	0.092	0.949	0.702	0.624
Upper secondary school	0.066	0.622	0.684	0.728
Basic vocational school	0.178	0.821	0.493	0.468
Primary school	0.138	0.756	0.513	0.536
Primary school unfinished or no education	0.248	0.958	0.400	0.378
Unemployment				
Unemployed	0.066	0.149	0.598	0.600
Social benefits				
Benefits total	0.041	0.301	0.555	0.611
Old-age pensions	0.051	0.176	0.591	0.662
Allowances total	0.102	0.085	0.528	0.529
Others	0.134	0.051	0.502	0.529

2.2. Segregation indices in Warsaw

Indicators	Unevenness (D)	Exposure (P_a)	Concentration (DEL)	Centralization (ACE)	Clustering (SP)
1988					
Age					
0-9	0.062	0.130	0.376	0.160	0.994
10-19	0.101	0.129	0.395	0.099	0.994
20-29	0.035	0.124	0.449	0.156	0.992
30-39	0.064	0.195	0.387	0.169	0.995
40-49	0.069	0.133	0.422	0.162	0.993
50-59	0.078	0.138	0.487	0.170	0.991
60 years and more	0.139	0.196	0.499	0.168	0.991

Indicators	Unevenness (D)	Exposure (P_a)	Concentration (DEL)	Centralization (ACE)	Clustering (SP)
No. of members of independent households in flats					
1-person	0.094	0.274	0.500	0.167	0.991
2-person	0.058	0.280	0.487	0.172	0.991
3-4-person	0.081	0.420	0.410	0.168	0.994
5 people or more	0.136	0.064	0.373	0.137	0.991
Education					
Higher	0.088	0.210	0.445	0.183	0.993
Secondary school	0.017	0.429	0.444	0.171	0.997
Basic vocational	0.086	0.143	0.422	0.154	0.992
Primary	0.053	0.241	0.446	0.149	0.993
2002					
Age					
0-14	0.063	0.127	0.34	0.386	0.997
15-29	0.044	0.243	0.379	0.42	0.998
30-44	0.031	0.195	0.373	0.428	0.996
45-59	0.053	0.234	0.389	0.423	0.999
pow. 60	0.124	0.235	0.476	0.53	1.004
No. of members of families and of independent households in flats					
With one child	0.020	0.606	0.374	0.412	1.003
With two children	0.022	0.336	0.337	0.366	0.998
With three children or more	0.084	0.064	0.298	0.328	0.992
1 person	0.105	0.330	0.481	0.574	1.008
2 people	0.037	0.285	0.436	0.512	0.999
3 people	0.077	0.216	0.383	0.425	1.001
4 people	0.130	0.163	0.348	0.367	1.003
5 people or more	0.153	0.056	0.315	0.341	0.998
Education					
Higher education	0.086	0.735	0.388	0.440	0.998
Post-secondary school	0.019	0.945	0.391	0.440	1.000
Upper secondary school	0.016	0.593	0.400	0.456	0.995
Basic vocational school	0.110	0.887	0.406	0.439	0.995
Primary school	0.066	0.829	0.391	0.440	0.994

Indicators	Unevenness (D)	Exposure (P_a)	Concentration (DEL)	Centralization (ACE)	Clustering (SP)
Primary school unfinished or no education	0.077	0.986	0.353	0.402	0.993
Unemployment					
Unemployed	0.055	0.138	0.398	0.446	0.994
Social benefits					
Benefits in total	0.079	0.295	0.448	0.516	1.002
Old-age pension	0.106	0.193	0.464	0.532	1.000
Allowances in total	0.056	0.068	0.431	0.492	0.995
Incapacity pension	0.048	0.042	0.425	0.476	0.994
Unemployment benefit	0.099	0.007	0.414	0.445	0.994
Social welfare	0.177	0.006	0.472	0.546	0.994
Other allowances not related to income	0.053	0.026	0.419	0.481	0.994

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